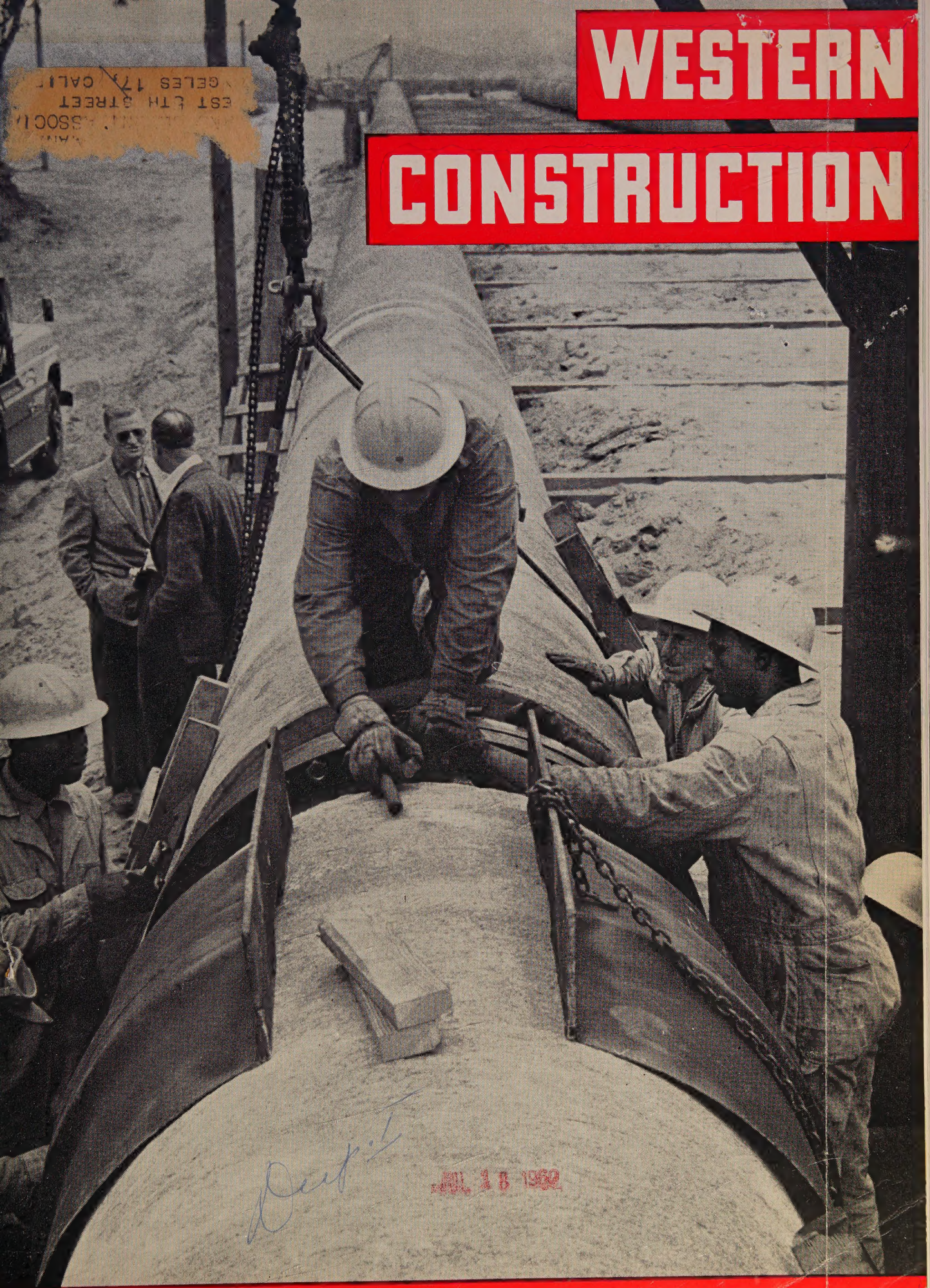
WESTERN CONSTRUCTION



JULY 1960

Passes Toughest of Tests *under all the down pressure and shock dozers can handle, failures ended by standardizing on*

Aeroquip Hose and Reusable Fittings

...from Job Report, Henry Bounds, Operator, C.W.Wright Cons. Co., Kermit, Texas

"With Aeroquip I can forget about hose"

Dozers are under all the hydraulic down pressure and shock they can handle when working in the Caleche rock of the Texas Permean Basin. Ordinary hydraulic hose can't take it.

Henry Bounds, operator for C. W. Wright Const. Co., didn't like the regular morning chore of checking for hose weakness, and, even then, getting frequent hot oil baths from failures with attendant downtime and expense. Now, he has replaced all ordinary hose with Aeroquip. So easy to do, too—all that was needed was a few feet of hose and a handful of fittings. No special tools. And replacements take everything Henry can give his dozer.

Reports like this on file prove you're in good hands when you consult with Aeroquip. Your Aeroquip distributor, a fluid line specialist, will give you our bulletin #ES 280, "Hoseline Installation and Routing Guide." He'll discuss, without obligation, various applications that might be helpful to you. His number is in the "Yellow Pages" under "Hose."

STANDARDIZE ON Aeroquip

REG. TRADEMARK

Aeroquip is so easy to use—inventory's just a few feet of hose and a handful of fittings.

AEROQUIP CORPORATION, WESTERN DIVISION, BURBANK, CALIFORNIA

AEROQUIP NORTHWEST WAREHOUSE, 635 N. W. 16TH AVE., PORTLAND, ORE.

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN CANADA, U.S.A., AND ABROAD

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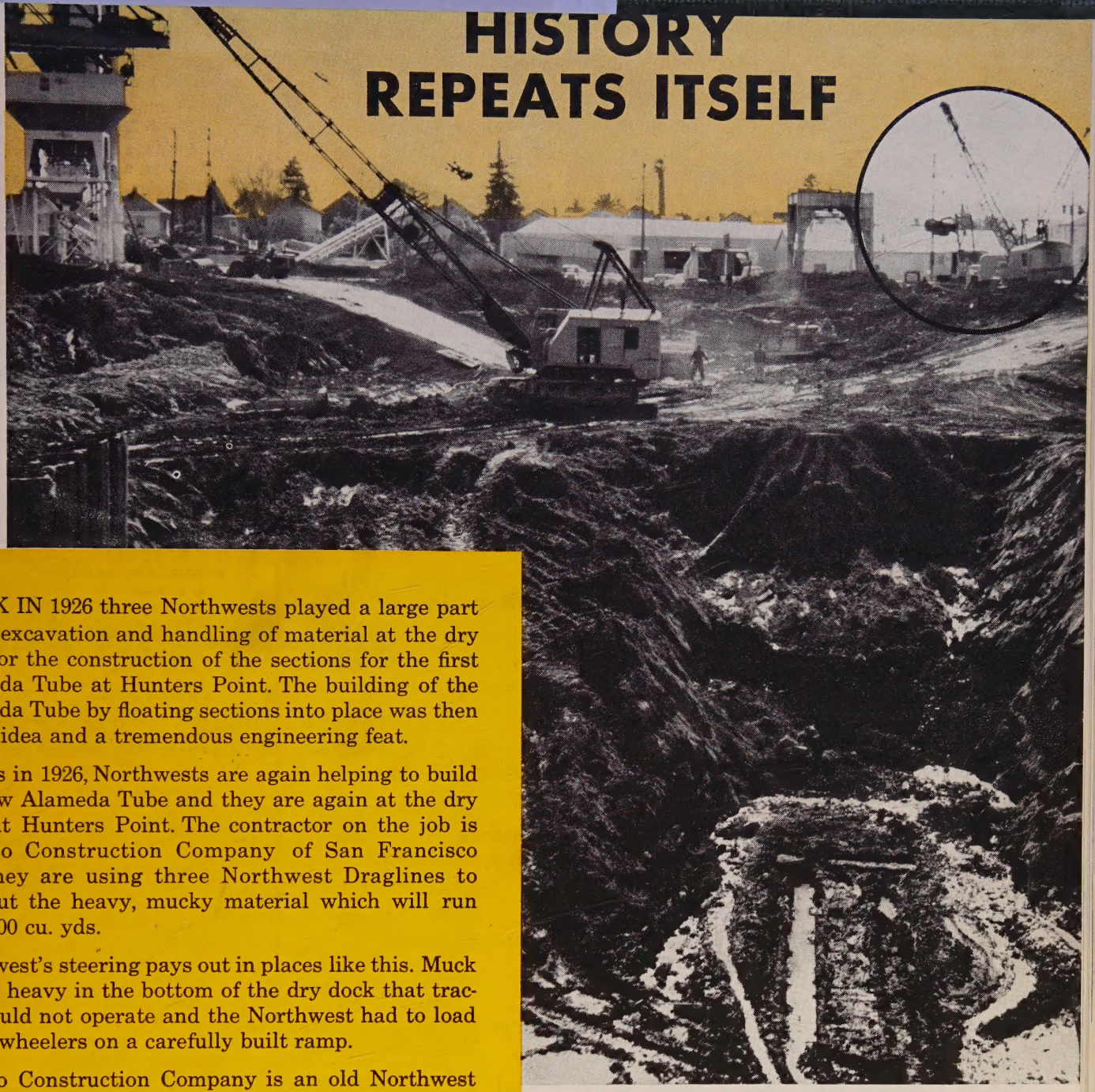
HISTORY REPEATS ITSELF



ACK IN 1926 three Northwests played a large part the excavation and handling of material at the dry ck for the construction of the sections for the first ameda Tube at Hunters Point. The building of the ameda Tube by floating sections into place was then new idea and a tremendous engineering feat.

st as in 1926, Northwests are again helping to build e new Alameda Tube and they are again at the dry ck at Hunters Point. The contractor on the job is ombo Construction Company of San Francisco d they are using three Northwest Draglines to ke out the heavy, mucky material which will run 90,000 cu. yds.

rthwest's steering pays out in places like this. Muck s so heavy in the bottom of the dry dock that trac- rs could not operate and the Northwest had to load e 10 wheelers on a carefully built ramp.

ombo Construction Company is an old Northwest er and the fact that they are now operating their th Northwest rig forms a testimonial to output and rformance that should mean real evidence worth nsidering by anyone adding to their Crane, Shovel Dragline equipment.

NORTHWEST ENGINEERING COMPANY
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WESTERN CONSTRUCTION

KING PUBLICATIONS

JULY
1960
Vol. 35 No. 7

CONTENTS

COVER—First bolts installed at the top of the flange as workmen add a 200 ton pipe string to the shore end of a giant ocean outfall being pulled into place at Watsonville, California. Sleeve in the foreground will be placed over the flanged joint and filled with grout. For details of this project see page 41.

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★

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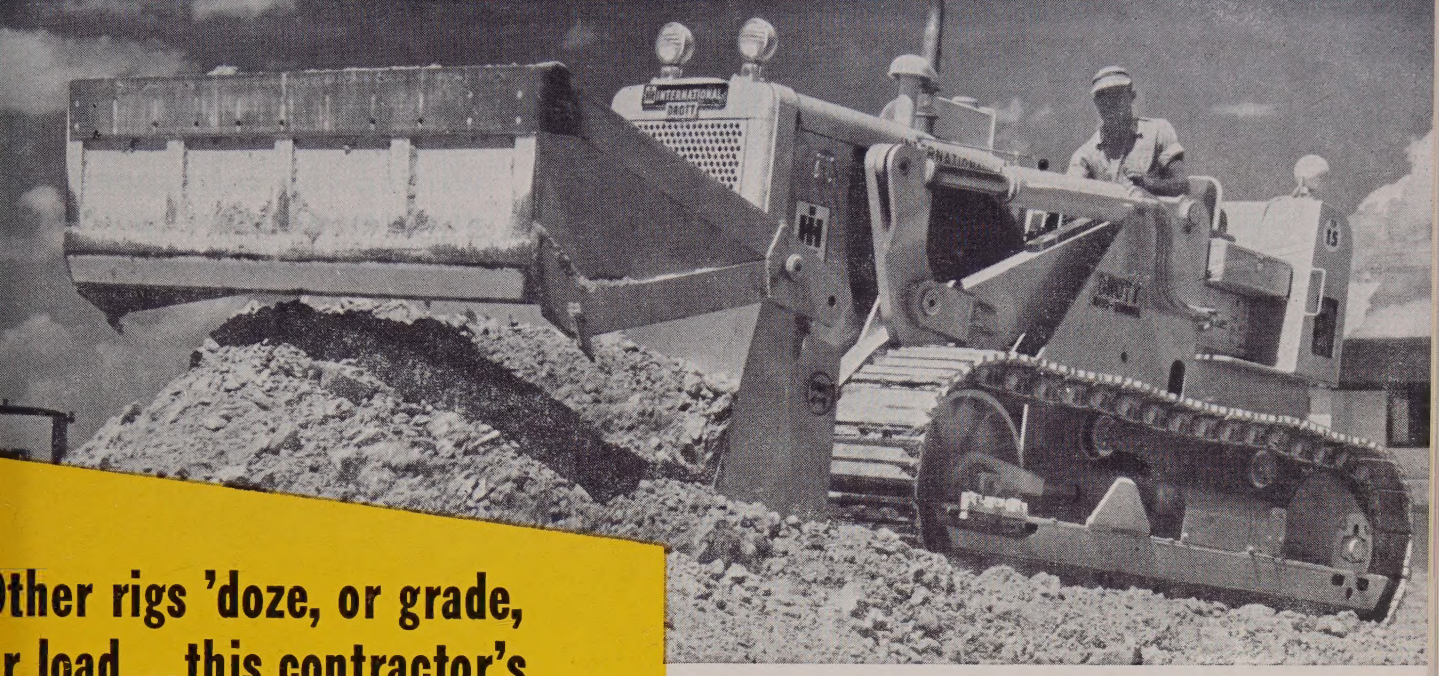
For 34 years serving the construction industry of the Western States



Contractor's 2¼ cu. yd. TD-15 Four-in-One roughs out a new street with its earthrolling bulldozer action!

Other rigs 'doze, or grade, or load...this contractor's TD-15 Four-in-One does all..and more!

This excavating contractor compared limited-duty rigs with the International Drott 4-in-1. He found other outfits could either load, or bulldoze, or excavate, or grade, only.

But the exclusive clam-action 4-in-1 does all these jobs, and much more. It excavates, 'dozes, loads trucks, does his rough or final road-grading, and landscaping. He (like thousands of other contractors) gets famous 4-in-1 versatility unlimited!

Why limit your income to what an old style single-action loader or any other limited-duty rig can earn you? Prove to yourself each big-capacity 4-in-1 action "doubles" for one or more special-duty machines—each action gives you an amazing range of job-handling working positions! See how only the clam-action 4-in-1 can upgrade you to multi-operation profits! Let your International Drott Distributor demonstrate!

To "surround" elusive loose materials—backfill or grade in cramped quarters, 4-in-1 clamshell action is the answer!

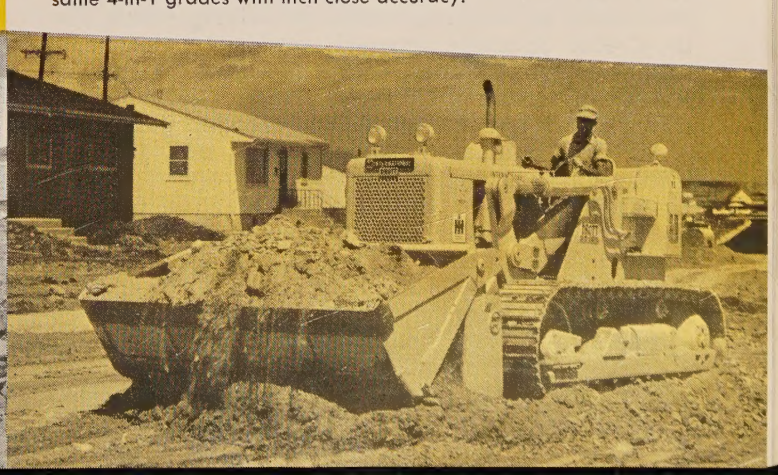
Skid-Shovel action—lets the TD-15 Four-in-One apply 39,200 lbs. of pry-action break-out for tough digging!

INTERNATIONAL® DROTT®

International Harvester Co., Chicago 1, Illinois

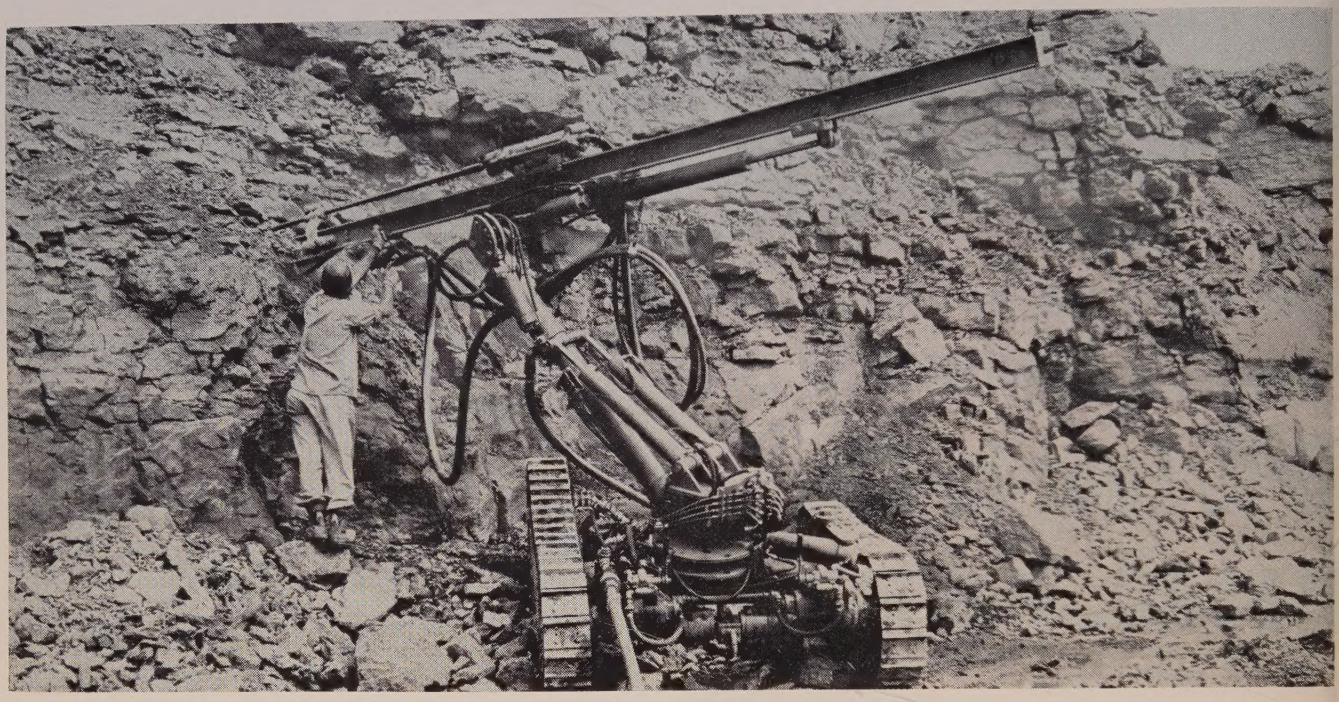
Drott Manufacturing Corp., Milwaukee 15, Wisconsin

With "carry-type scraper" action, the same 4-in-1 grades with inch-close accuracy!



NEW EQUIPMENT

Obtain more information on these new developments in construction equipment by writing the corresponding numbers on reply postcard.



One-man, crawler-mounted drill rig by CP

Announced as the most advanced crawler-mounted drill unit, **Chicago Pneumatic Tool Co.** places on the market its G-900 Tracdril. From specially designed crawlers to its drill boom construction, the unit results from more than five years of engineering research to develop a one-man, mechanized unit. The G-900 incorporates several major improvements.

Based on the desires expressed by drillers, the unit is now the only mechanized drill rig capable of drilling over either track at right angles. It can cover a 17-ft. diameter and 180 deg. of arc. In the horizontal plane, it can drill holes 25 in. above the ground, and the boom can be raised to a full height of 11 ft. An 85-deg. swing of the carriage allows vertical holes to be drilled regardless of slope conditions.

A 12-hp. tramming team, which is strong enough to tow a compressor up a rugged grade or maneuver over rocky terrain, represents the driving power for the G-900. Specially designed crawlers furnish 1,350 sq. in. of ground contact with a 10-in. width of track. Release of the tramming throttle automatically brings controls back to neutral and sets brakes on the tracks.

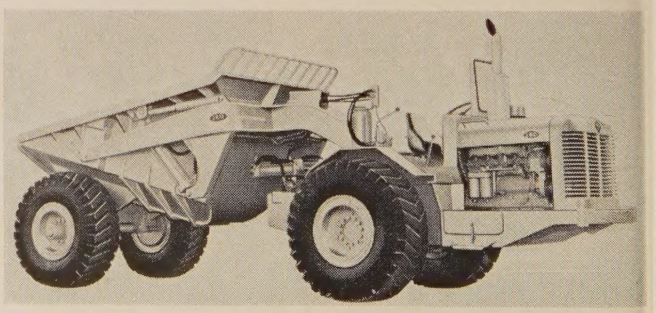
All drilling operations—swing, lift, and tilt are hydraulically controlled. Of equal importance is the fact these controls are dual, with one set at the forward end of the drill boom, and the other at the tramming position. This permits the operator to control every rig maneuver, from either front or rear, saving steps and increasing production.

The machine is a natural mounting for the 4 in. or 4½-in. Deep-Hole Drill which features forward-reverse or neutral rotation. The Tracdril is also adaptable to the use of auger bits for drilling in softer formations. . . . *Write No. 150*

A-C adds a rear dump motor wagon

A new all hydraulic TR-160 rear dump motor wagon has been added to its construction machinery line by **Allis-Chalmers Manufacturing Co.** The unit has a carrying capacity of 12 tons—7.7 cu. yd. struck and 12 yd. heaped. It is powered by a 6-cylinder A-C supercharged diesel rated at 155 hp. at 2,200 rpm. Shipping weight of the unit is 28,100 lb. A constant-mesh transmission provides five forward speeds from 3 to 25.4 mph. and a reverse at 3 mph. The machine

(Continued on page 17)



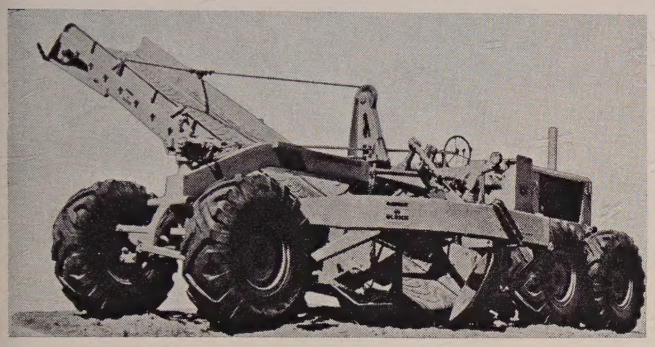
can make a complete non-stop turn in 22½ ft. When empty 2/3 of the weight is carried on the tractor tires and when loaded the distribution moves to 49% on the tractor wheels and 51% on the wagon wheels. Operator comfort and safety are designed and built into the machine.

The wagon body has a loading area 11 ft. x 7 ft. 10 in. and provides a big target for shovel or dragline. Two double-acting hydraulic jacks provide dumping power to a maximum angle of 52 deg. The wagon is quickly interchangeable with the 7 yd. S-160 scraper.

. . . Write No. 151

Elevating grader loads 900 yd. per hour

Designed to match the production capacity of the Caterpillar No. 14 motor grader, **Ulrich Manufacturing Co.** announces the Domor Model 64 elevating grader with a loading capacity of 900 cu. yd. per hour.



The machine features a 48-in. belt, a 36-in. disc, and a higher belt speed. In addition to the increased loading capacity, several design innovations reduce operating costs and installment time.

A new mechanical arrangement prevents the accidental damaging of the loading belt with the plow disc. The conveyor frame is of one piece construction, giving greater strength without increasing weight. Conveyor lengths up to 31 ft. are available.

. . . Write No. 152

Capacity and portability are featured

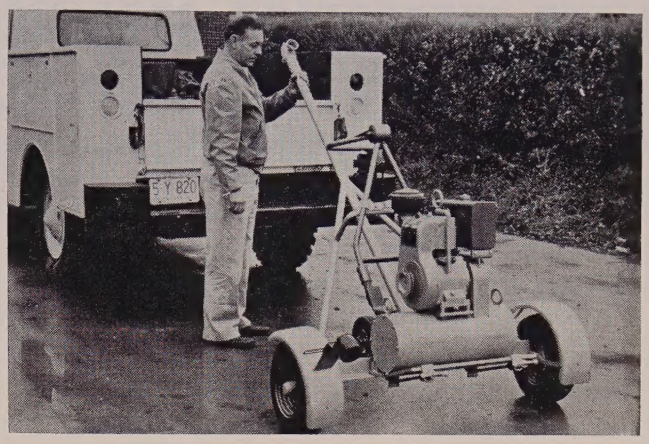
For producing gravel where the demand includes portability of the crushing plant and high output, **Diamond Iron Works,** announces its new Model 70. The high output of the plant is combined with an acceptable weight for quick highway moves. The

unit operates in a closed-circuit and has a capacity exceeding 175 cu. yd. of material per hour passing a 1-in. screen, based on 25% oversize. The major component units on Model 70 include a 10 x 36-in. jaw crusher, 32 x 24-in. roll crusher, 2½ deck vibrating screens of 4 x 12-ft. size and 30-in. belt conveyors. The travel weight is about 55,000 lb.

. . . Write No. 153

Trailer to move your Jay tamper

Having pioneered the field of one-man vibratory compactors, **Jay Division,** J. Leukart Machine Co., Inc., has developed a trailer for easy transport. The

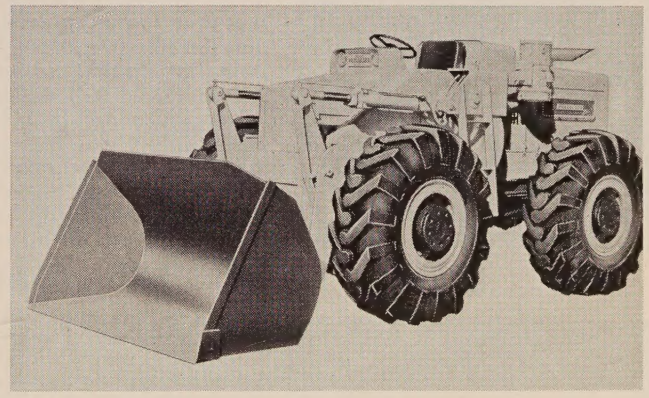


trailer balances to permit the tamper to be loaded and unloaded by one man. This applies equally to the three models weighing 235, 335, and 440 lb. The trailer carries any of the three models. Prior to the development of the trailer, the machines had to be lifted onto trailers or trucks. This was not convenient with the larger models, and the problem is now solved with the new trailer. The trailer weighs 110 lb., has two wheels with Timken bearings and pneumatic tires. It is 92 in. long and 50 in. wide. Accessories include a bracket for a license, combination tail and stop light, and a standard socket as the trailer hitch.

. . . Write No. 154

Improvement in Hough's payloader

Improvements offered in the Series B models of the H-70 and H-90 Payloaders, announced by the **Frank G. Hough Co.,** increase the production and performance of these four-wheel-drive machines. While operating capacity of the H-90 remains at 9,000 lb., peak



lift has been increased to 18,000 lb. The unit has a longer wheelbase and wider tread to provide better balance and greater stability. Additional power is provided by a new Cummins diesel developing 162 hp. Tire size has also been increased. New air brakes are standard and give more positive control with less operator effort.

. . . Write No. 155

(Turn to page 130 for more New Equipment. New Literature can be found on page 126.)

CEDARAPIDS PORTABLE PLANTS-

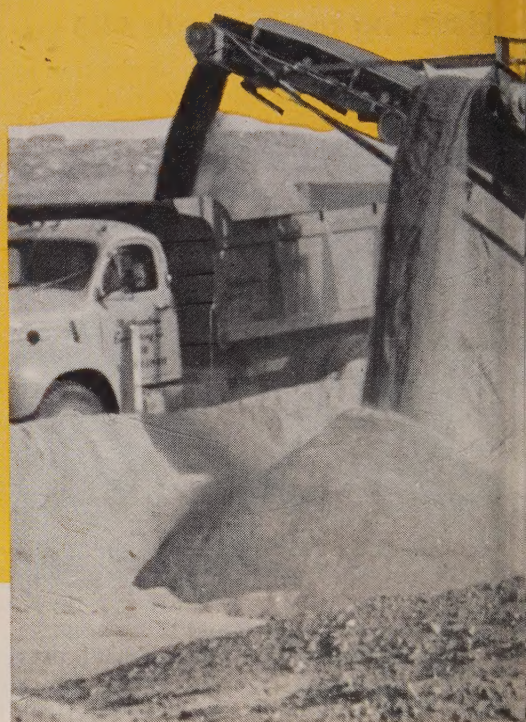
MEET INTERSTATE SPECIFICATIONS

With one of these Cedarapids Portable Plants you can meet the toughest Interstate specifications — and bid your jobs with full confidence that Cedarapids' extra-high production, with less maintenance requirements than most smaller capacity plants, will give you maximum profits on your bid price.

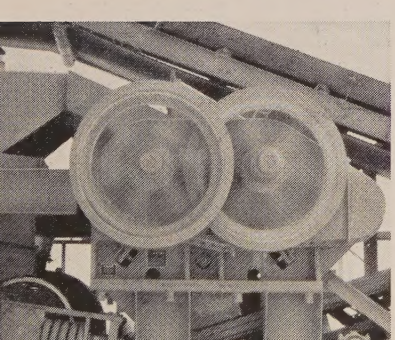
In today's competitive crushing picture, meeting specs right on the button is important — big-volume output is important — steady, low-maintenance operation is very important. But are you overlooking the advantages of 100% portability? The ability to move to the job fast — to move *with* the job and utilize job-site deposits to cut your hauling costs?

Cedarapids Portable Plants are engineered especially to give you many low-cost-per-ton advantages of stationary plants *on wheels*. Ask your Cedarapids Dealer to prove it!

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa



Each Component PRODUCTION-BALANCED



Twin-Jaw Crusher increases primary capacity 40% to 100%

In the two biggest-producing Cedarapids Portables—the Super Commander and the Challenger—an exclusive Twin-Jaw Crusher is used to step up primary capacity and thus increase overall plant production. The Twin-Jaw Crusher combines overhead eccentric, forced feed design with two movable, synchronized jaws operating at high speed to provide the high velocity jaw action that crushes tremendous hourly tonnages of even the hardest materials. Jaw life 5 to 8 times longer than that on single-jaw crushers reduces maintenance.

Roll Crusher, Feeder, Conveyors Elevating Wheel all matched to primary output

Every component in Cedarapids Portable Plants is production-balanced to permit a fast-paced flow of materials from feeder to delivery conveyor. With the Roll Crusher's large roll diameter, combined with the greater width of the rolls (the factor which controls capacity), the secondary crusher balances the output of the Twin-Jaw primary. On the Super Commander and Challenger Plants, the feeder, conveyors and elevating wheel are larger than usual to handle increased plant production.

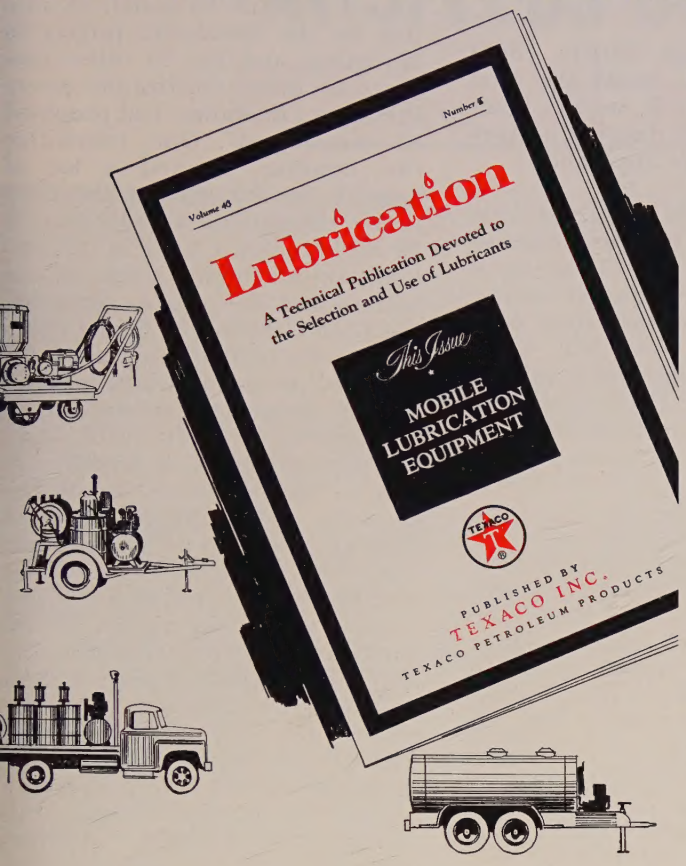
S560-N

Cedarapids Built by IOWA

CEDARAPIDS CHALLENGER

When specs call for high tonnages of 100% crushed products, this is your plant! Arranged one way, it produces three sizes of 100% crushed aggregate, plus sand and fines. When 100% crush is not required and pit materia does not have excessive fines, the Challenger can be fed from front or rear to produce one to four products.

prolong equipment service life

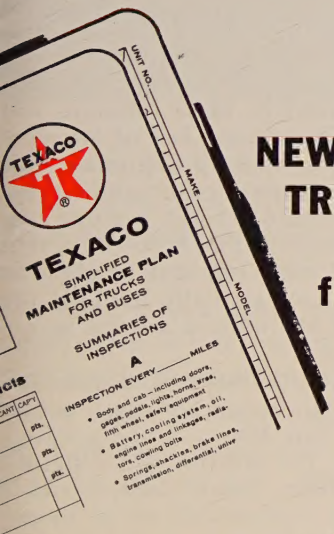


The whole truth about mobile LUBE RIGS

- What good lube rigs are made of—the products and the dispensing equipment.
- How to use lube records to make your rig more valuable
- Special purpose lube rigs.
- Pros and cons of mobile and centralized lubrication.

What does it take to make a mobile lube rig? What do you put on it? How do you use it? The questions have been coming in so fast lately that Texaco has devoted a whole issue of its magazine, *Lubrication,* to answering them: the March 1960 issue, titled "Mobile Lubrication Equipment."

Lubrication is a major factor in cost control, and lube rigs can be a major factor in thorough maintenance, so send for your free copy of the March *Lubrication.* Supply of these valuable booklets is limited, so if you want one, send in your request *now* to Texaco Inc., 135 East 42nd Street, New York 17, N.Y., Dept.



NEW TRUCK RECORD FOLDER fits itself into your schedule

xaco's flexible new truck record folder lets you stick to lube schedule that works best for you without running o bookkeeping problems. Lubrication and oil schedules completely separate from mechanical maintenance d replacement parts schedule—you don't have to follow pre-established routine to use the folder profitably. d this new folder accounts for every single dollar you nd on truck maintenance for a whole year. Get yours v.

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TEXACO LUBRICATION ENGINEERS

Every now and then we'll bring you a batch of "sleepers," little angles, so easy to overlook, where big savings in money and time can be made. If Lube Logic doesn't solve your problems, call your local Texaco man. Anytime, all the time, he's your best source of money-saving lubrication ideas. Don't forget that "Lubrication is a major factor in cost control." Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

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The WEST from WASHINGTON

By E. E. HALMOS, JR., Washington, D. C.

Biggest news from Washington for Westerners is the unexpectedly swift action of Congress in approving the long-blocked San Luis project for California—including the controversial provision that some of the land to be served need not come under the 160-acre limitations of federal reclamation law.

You'll recall (see June column) the bill went through the Senate last year—minus the provision permitting greater than 160-acre holdings—and remained bottled up in House committees for nearly a year. Early in May, the House Rules Committee suddenly "granted a rule"—permitted the bill (S.44) to come out to the floor for debate. And in three days of hot argument, Western sponsors managed to ram it through all objections, re-inserted the provision for greater landholdings, and got the Senate to agree so that the measure was ready for Presidential signature.

Passage of the bill is a real breakthrough for all Western water development—a point far more significant than the $290 million federal contribution and the nearly $1.7 billion of state money that will be spent before the project is built and in operation.

Most important, perhaps, is the legal recognition of a federal-state partnership in construction of such projects, which will serve both federal and state lands. Equally important is recognition of the legality of transferring water from one watershed to another for irrigation purposes.

Although most of the Congressional fight against the bill centered on the 160-acre limitation provisions (as expected) inclusion of the specific right to serve larger holdings with state-owned water is thought to be of least importance: Most attorneys in Washington felt that the controversial Section 7 wasn't necessary, that federal law wouldn't apply to state lands anyway and that the legislative history of the bill itself would make this point sufficiently clear for the guidance of any future court.

Next step toward getting the project under way will be an agreement between California and the U.S. (through the Bureau of Reclamation) covering joint financing, construction and operation. This agreement must be reached by Jan. 1, 1962, although BuRec could proceed alone to build the dam (a 2.1 million ac. ft. storage reservoir) as originally designed to supply federal service area lands.

* * *

More than $130 million of that $1.07 billion of military construction appropriations will be spent in Western states. Biggest share—some $80.7 million—will come from the Air Force; Navy will spend $30.8 million; Army $19.3 million. And, in addition, all three military departments will spend about $11.5 million in Western states for National Guard and various reserve facilities.

Housing for personnel is a big item in the bill. A total of 3,050 units are authorized: Army will build 1,450 units (at Ft. Huachuca, Ft. Sill, Ft. Lewis and Ft. Ord); Navy can build 1,100 (at Camp Pendleton, Pt. Hugo and Twentynine Palms); Air Force, 500 (at Beale, Brooks and Lowry AFB).

Biggest individual job for any service will be the Navy's Lemoore Naval Air Station, for which a total of $10.6 million was appropriated. Air Force will spend $7.4 million at March AFB in California, and $5.95 million at Fairchild AFB, at Spokane.

Out of the over-all construction total approved by Congress (It was $34 million under budget requests), the Air Force gets the lion's share—$726 million. Army has $147 million; Navy $126 million. Congressional comments brought out the fact that nearly a third of the total, $409 million, will go for construction of missile operation, testing and training facilities.

* * *

Moving fast to meet its July adjournment deadline, Congress brought up money bills in rapid fire order early in June—most of them containing no great surprises for Western construction men.

The big $3.9 billion public works appropriation bill (HR 12326), for instance, was $86.2 million below budget estimates, but contained provisions for most items Westerners desired, with few exceptions. Over-all, it provided $891.1 million for Army Civil Works (a reduction of about $45 million from budget requests); $277 million for the Bureau of Reclamation (about $24 million below budget requests); $2.7 billion for the Atomic Energy Commission (a drop of $16.2 million).

But, included were allocations of $2.5 million to start work on Yellowtail Dam in Montana; $2 million for the Seedskadee project in Wyoming, and for 39 other new starts of every description—where President Eisenhower had proposed 42 "new starts". One committee cut, however, caused a lot of anguish on the part of the California delegation: a reduction of $3 million (to a total of $5 million) for continuing work on the Sacramento deepwater channel. For Glen Canyon, the House chopped out the total appropriation for proposed protection works for Natural Bridge national monument.

A separate bill (HR 10401) making appropriations of $589.2 million for various offices of the Department of Interior (exclusive of BuRec), also showed some reductions from budget requests, but gave the Administration just about what it wanted in matters of importance for the West. For instance, the Office of Saline Water got $3.95 million — exactly what was requested; the Bureau of Land Management received $26.3 million—about $2 million more than requested; the Bureau of Indian Affairs got $14.2 million for construction, about $1 million more than budgeted; the National Park Service got $18 million for construction, $1.3 million more than requested.

* * *

As noted in these columns, you haven't heard the last of attempts to raise annual appropriations for aid to communities in building pollution-control works, despite the upholding of the President's veto of this year's bill (HR 3610) that would have virtually doubled the current $50 million annual appropriation.

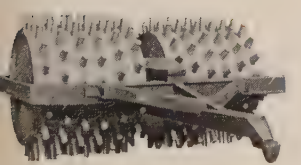
Most surprising evidence of Congressional feeling on this matter came from Massachusett's Rep. Joseph W. Martin, Jr., longtime Republican House leader, and a staunch conservative in money matters.

But, in an address before the annual National Rivers and Harbors Congress in Washington, Martin took occasion to urge the delegates to continue the fight for more federal money in this field, and to express a carefully-worded displeasure with the President's veto. Said Martin: "Recognizing the fact that additional federal aid was needed . . . Congress this year

TAKE 50 TONS OF PACKING POWER IN TOW — AT SPEEDS UP TO 10 MPH

NEW KO-CAL KONSOLIDATOR

New from KO-CAL—a roller that puts 100,000 pounds on the tires, plus 15,000 pounds on the tractor, is perfectly balanced for tractor traction and can roll down a course at speeds up to 10 mph. It's timed to modern day compaction specs—helps meet density requirements with fewer passes and at higher speeds. Konsolidator is easy to fill. Easy to kill weight, too, when you're ready to move on to the next assignment. Get the full facts and quality feature story from your KO-CAL distributor. Do it today. KOC 2



Ko-Cal Tamping Rollers . . .

—have feet shaped to penetrate deep, withdraw from fill with a minimum of disturbance. Self-cleaning in sticky material. KO-CAL'S advanced design greatly reduces drawbar pull, makes compaction faster. 5-Sizes in psi range to 2030 lbs.

Condensed Specifications New Ko-Cal Konsolidator

Weight (Empty)	37,000 lbs.
Fully Loaded Weight	115,000 lbs.
Body Volume, 700 cubic feet for Sand Ballast	70,000 lbs.
Towing Frame Volume, 130 cubic feet for Water Ballast	8,000 lbs.
Weight on Tires	100,000 lbs.
Weight per Lineal Inch	1,390 lbs.
Weight on Tractor (for traction)	15,000 lbs.
Tires	18.00 x 25-20 ply
Over-all Dimensions (Approx.)	29′ x 12′ x 10′

KOEHRING
Company of California
Stockton, California
DIVISION OF KOEHRING COMPANY

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passed a law increasing the existi authorization . . . this seemed a r atively small price to pay. The l islation was vetoed, and the ve sustained. This has not, howev eliminated the problem. I hope (t NJRC) will continue to battle . in attacking this grave proble again, at the next session of Co gress."

* * *

The long-smoldering coals Western resentment against feder claims on unappropriated wat rights were fanned into brig flames again, with the filing of U. S. Supreme Court master's pr liminary report on the dispute b tween Arizona and California ov disposition of Colorado Riv waters.

In essence, the special mast would chop California's claim 5,326,000 acre-feet of water dov to 4,400,000, award 3,800,000 ac feet to Arizona; his report wou restrict interstate rights in t stream to the portion below La Mead—not above it.

That report, coupled with t assertion by the U. S. Departme of Justice that the federal gover ment—not California—owns all the unappropriated waters in t state (in connection with an tempt by the City of Fresno to o tain water of the San Joaquin Ri backed up by Friant Dam) set W ern congressmen off and runni The Justice Department's cont tion of U. S. ownership is ba on the Treaty of Guadalupe dalgo, which ended the Mexic War, and under which the U. became "owner of all lands a all rights to use water." "This ow ership," said the Justice depa ment attorneys, "is still retain unless it has been divested pursu to act of Congress. There has b no such divestment."

The Supreme Court's Spe Master (Simon H. Rifkind, a N York attorney), in his prelimin report, questioned the interst compact method for settling in state water controversies, said W ern congressmen. The report c tends that the meaning of the C rado River compact is "irreleva since Congress, when it passed t Boulder Canyon Project Act " not accurately understand that compact apportionment inclu the Colorado River tributaries well as the main stream."

As a result, attorneys said, of Arizona and Nevada water m come out of the main stream competition with California p ects, but the tributaries in Ariz

← . . . *for more details, write N*

SCRAPER TEAMS PRODUCE

"A GOOD COMBINATION FOR THE ROUGHEST WORK"

TAKE boulders, volcanic ash and mud—mix well with decomposed shale—then add mile-high working altitudes, side-hill operation and unfavorable weather . . . these are some of the problems facing A. Tiechert and Son Inc. as they push a new highway through the Sierra Nevada Mountains in Eastern California. The job, 7.8 miles of freeway construction on State Highway 40, involves moving two million yards of earth in two five-month seasons. In spite of the obstacles, the Sacramento contractor holds the work to schedule, expects to complete the job on time this October.

Four D8 Series H Tractor-491 Scraper teams, push-loaded by D8s of the same series, set the pace for this difficult job. Because of the steep hill haul roads, they start the cuts and fills, then handle earthmoving on hauls up to 700 feet. DW21 wheel units take over on the longer hauls that range up to 7000 feet.

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On rugged big volume, short haul operations like this, Caterpillar track-type Tractor-Scraper combinations are the most efficient way to move earth. The new D8 Series H, for example, is over two tons heftier than the previous model, packs 23% more horsepower (235 flywheel HP), and with direct drive has a speed of 7.3 MPH forward. Team it with the 491 Scraper (34 cu. yd. heaped, 27 cu. yd. struck) or the 463 Scraper (28 cu. yd. heaped, 22 cu. yd. struck) for big capacity loads.

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BORN OF RESEARCH PROVED IN THE FIELD

and Nevada may be used in those states without accountability or diminution of the total claims of these two states.

Western congressmen joined the battle at once, on ground that such a decision — if upheld by the Supreme Court—would undermine all Western interstate water development agreements. By the same token, they said, reliance on the 100-year-old treaty of Guadalupe would invalidate most state water projects.

As you know, there are about a dozen bills in both houses of Congress now, calling for federal compliance with state water laws. Most have been lying dormant this session—but they'll be revived now.

* * *

Those special Public Works committee hearings into the Interstate Highway program (see June column) now seem unlikely to go further this session, and certainly will produce no legislation. But they've already produced predictable political charges and counter-charges. Iowa's Republican Fred Schwengel took 30 minutes on the House floor to denounce the make-up of the Special Subcommittee (he's one of four Republicans serving on it) as "stacked", and to charge Chairman John Blatnik (D. Minn.) with failure to consult the committee members, inept handling of the hearings, poor work by committee staff members, who have so far produced only two hearings.

Schwengel's charges were answered immediately by Democrat Jim Wright, of Texas, who argued that the nearings have been "fair" and have revealed useful information for the guidance of Congress.

Regardless of the political implications, however, it was obvious that the showing of real irregularities in construction of the 13-mile "Skelly Bypass" in Tulsa, Okla., is a serious blow to the highway program, and serious in its reflection on the integrity of all contractors, engineers and state highway organizations. Undeniably, the evidence of collusion that permitted a contractor to build the bypass with—in many cases—little regard for specifications, was damaging, and reflected badly on Bureau of Public Roads procedures in controlling state highway activities. It has already resulted in orders from BPR tightening up inspection procedures—but it is more likely to result in legislative interference next session, that would increase costs as well as federal inspection.

s make

Construction Products

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On highways, watch for action next session on the recommendation of the Highway Research Board for a $34 million, five-year program of expanded highway research. A special committee which included Washington State's W. A. Bugge and California University's Harmer E. Davis, commented that present expenditures by all agencies and private groups for highway research totals $17.8 million.

It's interesting to note that the committee recommended spending almost a third of the total amount ($10 million) on "improvement of knowledge of aggregates and soils", and another $5 million for translating the results of the AASHO road tests to conditions in other states. Another development recommended was expenditure of $3.5 million on development of a driving simulator—buf the committee's interest was centered on the possibility that such a simulator might be used for tests of lane markings, signings, and engineering improvements to roads, rather than on driver training.

And illustrating the urgency of highway construction programs was a Bureau of Public Roads report showing that in 1959, a total of 71,502,394 motor vehicles were registered in the United States. California, with 7.4 million vehicles, was first in the nation (ahead of New York, which showed 5 million). Other Western states lined up this way, in total registrations: Alaska, 71,469; Arizona, 578,434; Colorado, 884,697; Hawaii, 214,062; Idaho, 364,047; Montana, 375,592; Nevada, 162,506; New Mexico, 446,495; Oregon, 877,693; Texas, 4,350,573; Utah, 401,555; Washington, 1,281,381.

* * *

Briefs: With the powerful backing of Senate Democratic Leader Lyndon B. Johnson, observers rate chances good for S. 3557, a bill that would appropriate a total of $17.5 million for Fiscal Year 1961, to expand the research and other work of the Office of Saline Waters. . . . Although obviously not very happy about the whole matter, the Interior department has reported "favorably" on a bill (S 2640) that would include the proposed $81.5 million Nebraska Mid-State Project as a unit of the Missouri Basin project. You may remember that project advocates last year tried to get their plan through as a local affair, to be financed by federal loans, but got nowhere when it became clear that repayment would be a very long process.

WESTERN CONSTRUCTION

Western Contractors and "The White Fleet"

WESTERN contractors and construction men are internationally minded. Our larger firms have extensive experience in foreign construction, and their supervisory staffs represent long years of construction background in far-away places. They have been, and are ambassadors from this country in building facilities to aid distressed or backward areas. A completed dam, an irrigation system, or a finished piece of highway represent tangible contributions to international good will from the construction industry.

Preliminary work has been under way in the United States for about a year to establish and operate "The White Fleet"—a group of ships that would bring aid to a disaster area at any location in the world during times of emergency. This idea, frequently mentioned in the public press, would involve the use of reactivated naval hospital and supply vessels to be provided by the Government. Complete medical staff would be supported by private and public contributions. When not required for disasters, such as the Chilean earthquake, this mercy flotilla would provide more normal help from its doctors, nurses, public health experts, and educators to backward areas of the globe.

The idea is so meritorious that it needs no detailed description to bring a response from every citizen. However, the proposed service to be provided by The White Fleet appears to lack an important element. It does not include the equipment and men needed to restore water supplies, develop emergency waste disposal, and rebuild transportation and communication facilities in stricken areas. *Western Construction* proposes that the construction industry, spearheaded by progressive contractors and equipment interests in this region, get behind a movement that would add such an essential contribution to present plans for the fleet.

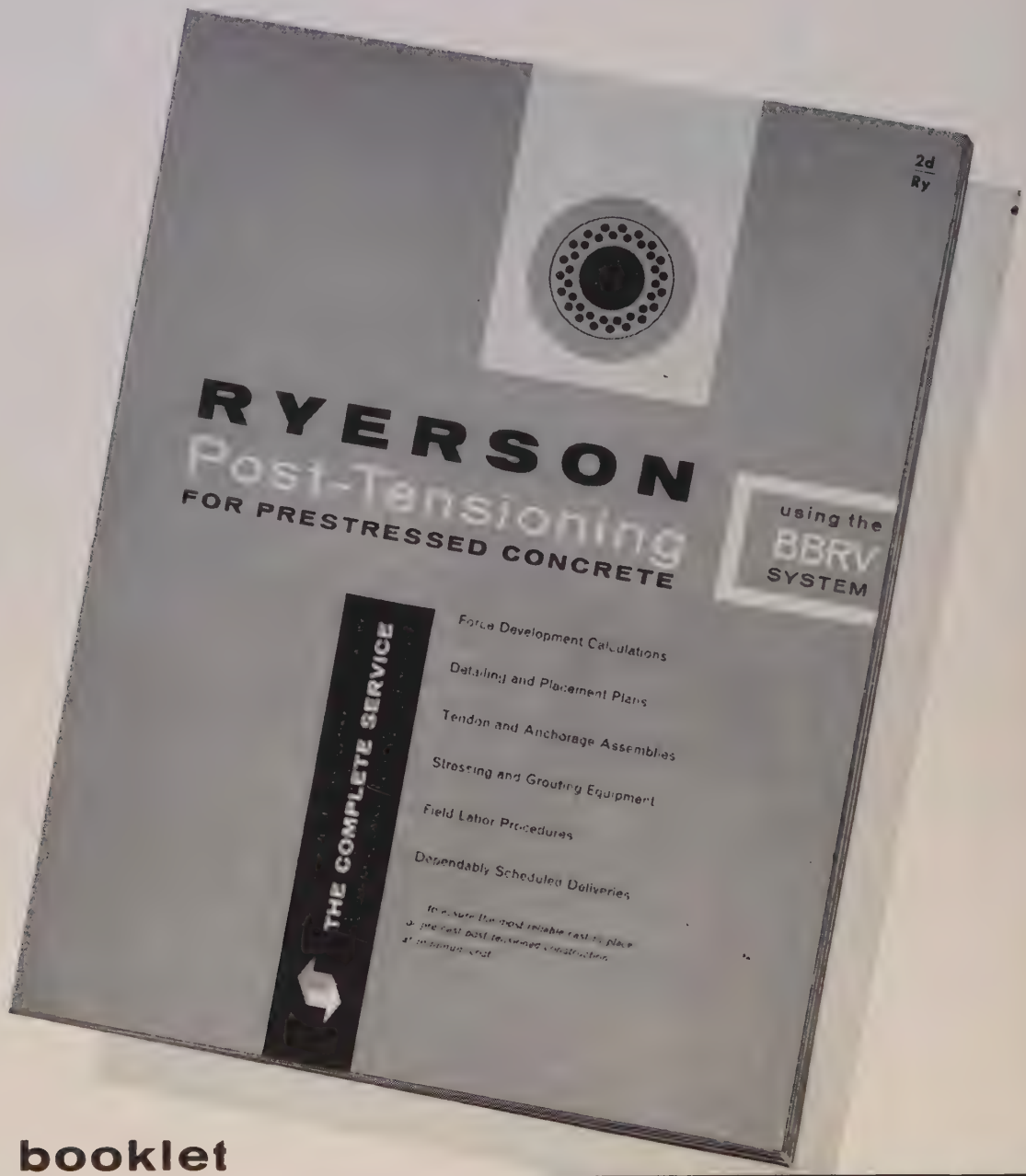
Briefly, the supply vessels that normally accompany this fleet on its disaster or regular missions would carry units of suitable construction equipment. Arrival of the fleet at a disaster area would provide these facilities concurrently with medical and hospital aid. While the fleet was en route to the scene, supervisory personnel and operators as needed to man the machines could be air-lifted and be on hand when the equipment was being unloaded.

Work to be done by this force of construction men and equipment can well be appreciated. Its service would aid immeasurably in the tangible results accomplished, both immediate and long-range. Equipment might be left at the scene as a further and more lasting contribution.

As the program and the progress take shape on establishing this fleet dedicated to international aid to the distressed, the suggested addition from the construction industry would augment and complete its usefulness.

The AGC has its "Plan Bulldozer" for local areas. Western chapters of the national organization could provide the initiative for a nationwide movement of the construction industry that would place it in the forefront of international diplomacy in the interest of peace and good will.

Jim Ballard



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KING PUBLICATION

WESTERN CONSTRUCTION

JULY, 1960

HOLD-BACK cable is dropped off rear flange of pipe string halted beneath gantry so another section can be bolted on. Pipe rides rubber conveyor wheels on 1,000-ft. track. Note wheel assembly in foreground beneath flange.

Giant outfall rides rubber rollers

Ingenious conveyor assemblies of surplus tank idler wheels used by contractor to assemble 3,850 ft. of 49-in. concrete-jacketed pipe and as launching track for the long pull into the ocean.

A 1,600-TON CONCRETE-cased sewer outfall pipe was successfully pulled on the floor of Monterey Bay from a unique conveyor-like roller track at Watsonville, Calif., early this month. The job marked a new record for size and weight of pipe pulled into position as a single unit. It is especially notable for the efficient methods developed by the contractor to handle the heavy joints of pipe, assemble them into strings, and connect the strings during the final pull with a minimum of heavy equipment.

The Freedom County Sanitation District project, part of a new sewage treatment facility, covers construction and installation of a 3,850-ft. ocean outfall of steel and concrete pipe having an inside diameter of 39 in. and an outside diameter of approximately 49½ in. The pipe is composed of a one-half inch thick steel cylinder with a one inch inside spun mortar coating, an exterior coating of ½ in. coal tar and fiberglass covered by two layers of gunite and wire mesh, approximately 4 in. thick. The pipe weighed about 856 lb. per lin. ft. (8 lb. in the water) for a total weight of nearly 1,650 tons. It is believed to be the largest diameter and heaviest weight pipe ever placed by the pulling method. Engineers were Brown and Caldwell, San Francisco. Prime contract of $474,000 was awarded to Valley Engineers, Inc. of Fresno, Calif., which specializes in pipe line and similar constructions. Inshore terminus of the outfall is a concrete surge chamber located about 100 yd. from the surf in the sand dunes.

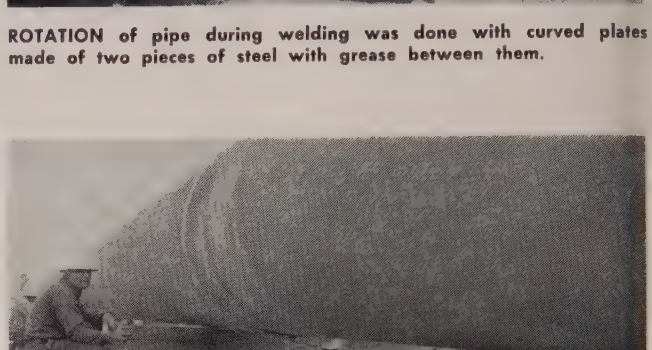
Alternative methods

The contractor considered a number of alternative methods for assembling and placing the sewer. One method involved shore handling with side-boom tractors, which would be lined up in pairs to walk the string to the surf as they were pulled into the ocean by a derrick barge. A second method covered excavation of an estuary where pipe sections could be welded into floating strings, towed out and sunk. This method would have involved construction of a floating dry dock for use in coupling one string to the next.

Finally the contractor surveyed the conventional railway on which

SUPERINTENDENT Ted Nielsen and co-owner Pete Price atop pipe check bolts on completed joint. Steel sleeve will be slipped over joint.

ROTATION of pipe during welding was done with curved plates made of two pieces of steel with grease between them.



PIPE string from storage bed is lowered on to roller track. Jack, center, supports 200-ton pipe while short timbers are withdrawn.

the pipe would be handled on flat cars.

The railroad was discarded as too costly to build. The idea of using side boom trawlers was also dropped when calculations showed that at least 19 of these machines would be needed (or their equivalent capacity in crawler cranes).

Conveyor track

The contractor tentatively selected the floating method and had worked out designs of the inlet, docks and floating drydock when the steel strike of 1959 brought the project to a halt.

During the interim, Ted Nielson, project superintendent, and Keith Vicient, project engineer, worked out a completely new approach to the job: Build a conveyor track with a gantry about midway in its length to unload pipe sections and place them on the tracks, and build timber storage racks in the sand beside the track to store completed pipe strings.

This method was adopted and Nielson and a crew of ten men began construction of a 1,000-ft. timber road bed beside the concrete surge chamber, extending forward to within about a 100 ft. of the water and back behind the chamber about 500 ft. The front of the bed stopped at a tall sand dune plug, which was left in place until all pipe work was completed. At 20-ft. intervals along his timber roadway prefabricated pedestal roller assemblies were installed. Each was made up of three surplus tank idler wheels, individually mounted in a steel pedestal. These surplus idlers were a real find. Each was about 10 in. wide and 10 in. in diameter with sealed internal roller bearings on a heavy axle protruding about 2 in. from either side. They were tested to a carrying capacity of 90 tons each. Carriages for the rollers were made up of three pair of heavy steel brackets welded between steel side plates having bolting flanges at the bottom. The wheels were simply set in notches in the brackets. Total cost of each roller pedestal was $145 compared to bids of around $450 for custom manufactured similar units.

The gantry was a simple affair consisting of three overhead I-beams welded to supporting pipes. A simple traveler composed of two idler wheels joined by side-plates was mounted on top of each of the I-beams. Suspended beneath the travelers were rachet operated chain hoists, each of 10-ton capacity. Travelers were moved with hand winches welded to the supporting posts.

A circular steel clamp for aligning the ends of individual pipe joints was mounted on a swing boom at the rear of the gantry.

A storage rack was constructed on the far side of the conveyor track. It consisted of heavy timbers built up to an elevation about 6 in. above the top of the rollers. Timbers spanning the entire width of the bed were set at 15-ft. intervals and voids were filled with sand.

Up to this point, the job equipment list consisted of one item—a Caterpillar D-6 crawler with side boom and a D8 dozer. Later a Link-Belt crane with pile hammer to drive five bents of piling through the dunes at the forward end of the conveyor track was brought in. A power winch was set up at the

rear of the track to pull the pipe strings and a diesel generator set-up lights the area.

Pipe fabrication

Pipe was made up in 30-ft. sections. The steel tubing was rolled by Southwest Yuba Consolidated at Alhambra and then shipped to Oakland where West Coast Painting Co. applied the ½-in. coal tar and fiberglass built-up coating and American Pipe and Construction Co. applied the interior and exterior concrete coatings. (Coal tar and glass wrap was applied by West Coast Painting, Oakland.) Concrete cover which supplied necessary weight to keep the line in place under water was hand trimmed to meet 1% weight tolerance. Completed 30-ft. sections, each weighing more than 12 tons, were trucked to the site, where they were unloaded with the hand-operated chain hoist, placed on the roller track, and welded together. To facilitate the critical field welding, pipe ends were left bare of coating.

Ends of opposing joints were clamped in the ring clamp and precisely aligned by its hydraulic closing apparatus and the first weld pass made between the open faces of the clamp. This was followed by a hot pass to fuse the two ends and the weld metal. Five filler passes completed the welding process. All completed welds were X-ray inspected.

In order to weld completely around the circumference of the pipe, it was necessary to rotate it. For this purpose the contractor employed another unusual device, a pair of steel plates curved to fit the circumference of the pipe set one on top of the other with a heavy layer of grease between. Inserted beneath the pipe on each roller assembly these plates made a crude but effective bearing permitting the pipe to be rotated in place with hand jacks.

The sections were welded into eight 480-ft. strings, each using 16 joints. The end joint of each string was fabricated with a heavy steel bolting flange. As welding was completed on each string, it was towed to the rear end of the conveyor track and jacked up with hand-operated hydraulic jacks to the level of the storage bed. Short lengths of timber were stacked up to match corresponding bed timbers and the jacks were withdrawn and the pipe was rolled onto the storage bed. Inside coating of the pipe concrete at the joints was placed with hand trowels by the contractor's crew, who also applied the exterior coal tar. Concrete guniting of the exterior joints was done on a sub-contract after all welding had been completed.

When the 8 pipe strings were assembled, the contractor cut away the sand dune plug at the ocean end of its conveyor track. He added five more conveyor assemblies, each of these individually mounted between a pair of piles on timber skids which could be raised or lowered. Purpose of these last five rollers was to guide the pipe off its level track onto the gently sloping beach. A steel pulling head with a wide sled was attached to the forward end of the pipe and it was ready to be towed into the ocean.

Pulling the pipe

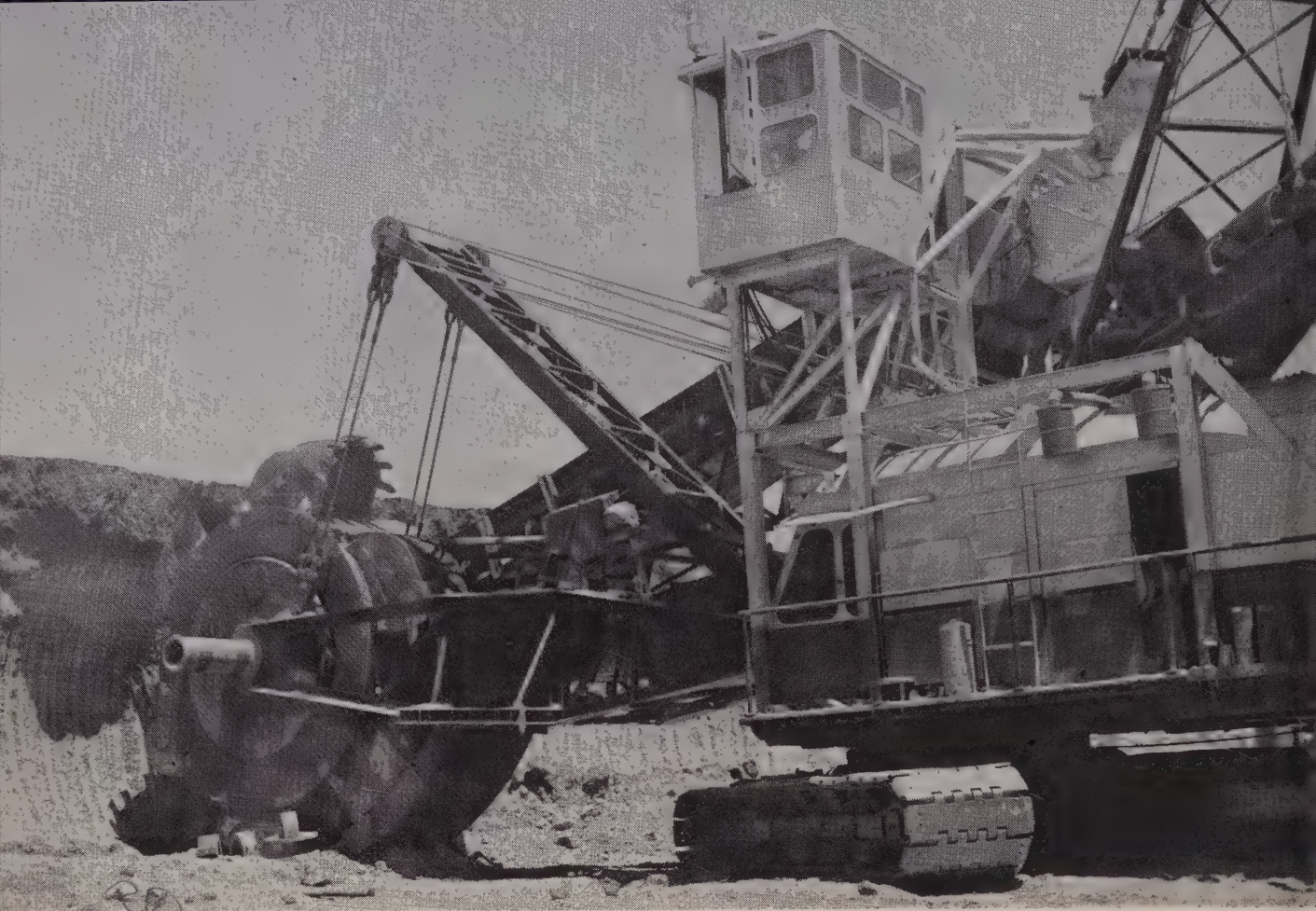
The pulling phase was done by Smith-Rice, Inc., a marine construction firm, which moved a powerful derrick barge up from Los Angeles to the site anchoring it about 2,000 ft. off shore for the first pull. The barge was spotted into position with two lateral breast anchors and two stern anchors and a line was fired ashore by a small rocket.

Superintendent George Mitchell set up a 3-way radio network connecting his command post on top of a nearby dune to the barge, and Ted Nielson with a portable 2-way radio at the pipe. The first string was eased along over the rollers onto the sandy sloping beach and into the surf.

The pull stopped when the rear flange was beneath the gantry. A second pipe string was rolled out over the track with two crawlers, each pulling a line wrapped around

(Continued on page 47)

PULLING head attached to front end of pipe ready for the trip through the surf. Pipe travels over rollers set between each pair of piles at the forward end of the conveyor track. Two-part pulling cable is attached to buoy at right. Target marks surge chamber.



Unique excavator at Abiquiu Dam

Earth fill dug and loaded in the pit with revolving buckets built on a 4-yd. shovel, at Corps of Engineers project in New Mexico. Material transferred to 4,300-ft. conveyor handling 2,000 yd. per hr. Dam will provide flood control on branch of the Rio Grande.

A RIVER of dirt is flowing along a 4,300-ft. conveyor belt at the rate of 2,000 cu. yd. per hr. to dam a major tributary of the Rio Grande in northwestern New Mexico. Upon completion in the spring of 1962, Abiquiu Dam will rise 325 ft. above the valley floor of the Rio Chama and will be the second highest rolled earthfill dam built by the Corps of Engineers (Mud Mountain Dam in Washington is 100 ft. higher).

Authorized by the Flood Control Acts of 1948 and 1950, Abiquiu Dam is a major element of the flood control phase of the comprehensive plan for the Rio Grande Basin in New Mexico. Jemez Canyon Dam, located on Jemez Creek about 20 mi. above Albuquerque, N. M., is the only completed element of the flood control plan. It was completed in October 1953.

Located in Rio Arriba County on the Rio Chama approximately 30 mi. above its confluence with the Rio Grande at Espanola, New Mexico, the Abiquiu Dam project includes a rolled earthfill dam, a flood control tunnel, an off-channel uncontrolled spillway, and primary and secondary highway relocations.

Site dictated size

It is interesting to note that Abiquiu Dam, which will rise 325 ft. above the valley floor, will have a storage capacity far in excess of the standard project flood. Engineering studies to determine the appropriate features of the project indicated that the most economical balance between rock excavation for the saddle, off-channel spillway and earth embankment was obtained with an embankment rising to a height of 325 ft. above streambed.

Any decrease in cost effected by lowering the height of the dam would be more than offset by the increased cost of additional rock excavation for the saddle spillway. Hence, it was cheaper to design and build this project with a dam 325 ft. high than with a lesser height which would be adequate to control the project design flood. Paradoxically, it was cheaper to build a bigger dam!

Capacity and spillway

Storage capacity at spillway crest of Abiquiu Dam, nearly 1,211,000 ac. ft., greatly exceeds that required for flood control and sediment reserve. The additional storage thus

IN THE PIT this machine excavates and loads the hauling units that transfer the fill material to the head end of the 4,300-ft. conveyor belt. The "Excavator" consists of six 1¼-yd. buckets turning on a 12-ft. diameter wheel and loading a short conveyor belt that dumps into a surge hopper. This hopper loads Eucs by short conveyor, for a haul to the main belt. ←

THE machine is mounted on a modified 4-yd. Lima shovel and operated from the elevated cab. The 30-yd. surge hopper allows loading to be carried out without stopping the excavator. →

fortunately provided by the most economical height of embankment is therefore available for partial control of the spillway design flood and its use results in a greatly reduced saddle spillway section.

Studies of hypothetical storms to determine spillway requirements indicate that two types of storms must be accommodated by a spillway for a dam in this area: (1) spring floods, characterized by a large volume of flow and moderate peak discharges; and (2) summer floods characterized by high peak discharges and moderate volumes of flow. The additional storage in Abiquiu Dam which would at all times be available for the control of super-floods renders a summer-type super-flood — highest peak discharges — practically harmless. The saddle spillway is designed to pass the routed peak of a spring-type super-flood which although having a lower peak discharge has the greatest volume.

Construction of the outlet works was initiated in August 1956 under a $5,000,000 plus contract with A. S. Horner Construction Co. and Midvalley Utility Constructors, Inc., Denver. This contract was completed in December 1958. The outlet works consist of a 12-ft. diameter flood control tunnel, an intake structure, gate chamber, and stilling basin. The 2,300-ft. concrete-lined tunnel was driven through shale and sandstone along the left abutment of the dam. Trash bars, built as an integral part of the intake structure, consist of a grill work of reinforced concrete beams. Slots have been provided for inserting stoplogs for closing off the tunnel in case an emergency condition would require closure of the tunnel.

A bell chamber 40 ft. in diameter is located near the midpoint of the tunnel just upstream from the embankment grout curtain. It houses two 5 x 9-ft. hydraulically operated slide gates. Access to the gate chamber is through a 16-ft. diameter vertical shaft. An operations building has been built at the top of the shaft, and houses an overhead travel crane, elevator operating machinery as well as a shop, general storage, equipment room and office space. The elevator in the vertical shaft is used for transportation of personnel and small tools and equipment.

A flip bucket and stilling basin have been constructed at the downstream end of the tunnel for dissipating the energy of the high velocity flow. During maximum discharge energy equivalent to almost 100,000 hp. will be dissipated within the stilling basin.

Main contract

Mittry Construction Co., Los Angeles, presently is building the dam embankment and spillway under a $8,500,000 contract. Construction started in March 1959 and is scheduled for completion in May 1962. The flood control tunnel is being used as a river bypass.

To cope with successive spring runoffs on the Rio Chama, the dam embankment is being built in three phases. Phase one, completed this spring, required the contractor to bring the embankment from streambed (elev. 6,045) to elev. 6,100 except for a 100-ft. wide section adjacent to the right abutment which was left at elev. 6,089. Thus a 100-ft. wide diversion channel overflow approximately 11 ft. deep and riprapped was provided to accommodate those flows above elev. 6,089 which exceeded the capacity of the tunnel.

The other alternate to this procedure would have been to raise the embankment to elev. 6,133, or about 85 ft. above streambed. This decision was reached after a study of the 1942 spring flood which was considered to have a theoretical frequency of about once in 5 years. Considerable risk would be involved if this flow would be exceeded with an 85-ft. high embankment. But if the capacity of the tunnel and the riprapped weir would be insufficient to contain the spring flow and the embankment to elev. 6,100 was overtopped, the surge of water resulting from a washout of this low embankment would be dissipated in valley storage before reaching inhabited areas downstream. Although the contractor was slightly behind schedule, an unusually cool spring permitted the spring runoff to occur gradually without any serious inconvenience to the contractor's operations.

The contract requires that phase two (elev. 6,250) of the embankment be reached prior to April 1961. This will bring the embankment to a height of 155 ft. above streambed and will be sufficient to control the anticipated 1961 spring runoff.

Phase three of the embankment will bring it to completion by May 1962.

Borrow pits and conveyor

The distances from the three

MAJOR EQUIPMENT

1	"Excavator"
1	Lima shovel, 6 yd.
3	Lima shovels, 4½ yd.
1	Lima backhoe, 1½ yd.
1	Lima crane, 50-ft. boom
24	Euclid bottom-dumps, 17 yd.
6	Euclid end-dumps, 17 yd.
5	Euclid scrapers, 17 yd.
2	Ferguson pneumatic rollers, 50 tons
1	2-section sheepsfoot
2	21-Cat watertanks (8,000 gal.)
2	Cat motor patrol graders No. 12
9	D-8 Caterpillars w/dozers (1 w/heavy duty ripper, and 1 w/scarifier)
1	Chevrolet fuel tanker, 2½-ton
1	Chevrolet lub unit
9	Chevrolet ½-ton pickups
1	Tire truck w/swinging boom (contract with Goodyear)
2	Ambulances

LOADING STATION on the 4,300-ft. conveyor. Oversize is scalped off and wasted. The control tower located above the plant has a closed circuit TV which permits the operator to observe the loading of the belt and the discharge.

STORAGE at the end of the belt provides capacity of 2,000 yd. or about a 1-hr. run of the belt. Discharge into the fleet of bottom-dump Eucs passes through a sprinkler system that adds the required amount of moisture.

designated borrow areas to the dam site vary from 1.4 to 2.2 mi. The contractor chose to use a 4,300-ft. conveyor system to move excavated material. The discharge end is located high on the right abutment of the dam site.

The Conveyor Co. of Los Angeles designed and erected the conveyor system, which passes through a cut, over a high ridge and over a steel trestle across a canyon tributary to the Chama. The U. S. Rubber Co. belt, 4 ft. wide, is driven by two 600-hp. electric motors. Maximum speed of the belt is 800 ft. per min. and its carrying capacity about 2,000 cu. yd. per hr.

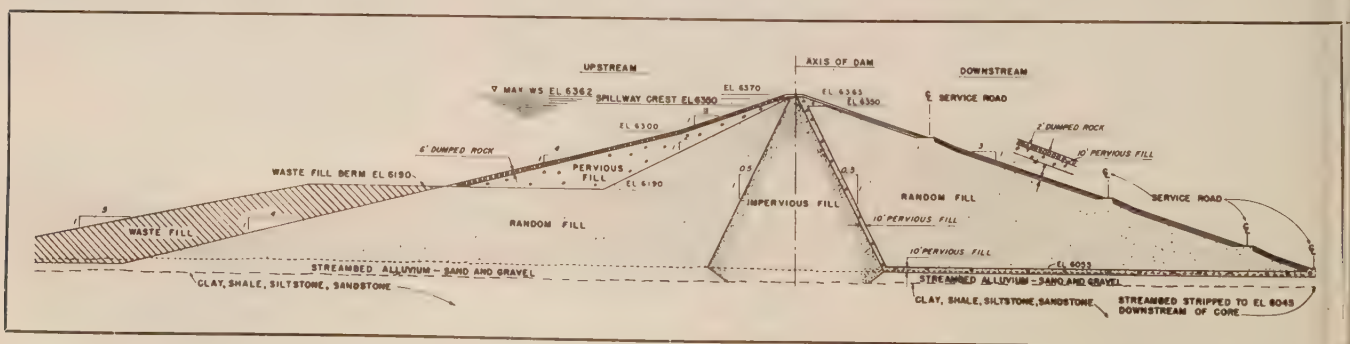
Near the loading end of the conveyor a scale automatically weighs and records the weight of material traveling on the belt. More than 35,000 cu. yd. of fill have been moved by the conveyor in a two 10-hr. shift day. By mid-May more than 1,800,000 cu. yd. of embankment were in place. The completed embankment will contain about 10,500,000 cu. yd. of fill.

Unique excavating machine

The contractor, of "Mittry Mole" fame, has designed and built a semi-automatic excavating machine for this job. The excavator is built around a 4-cu. yd. Lima shovel, Model 1601. The working end of the excavator is mounted on a special boom and consists of a 12-ft. diameter wheel on which are mounted six modified 1¼-yd. Esco buckets. As the wheel rotates at a rate of 10 rpm., the buckets dump the excavated material onto an overhead collecting belt 4 ft. wide.

From this belt material transfers to a 2-section belt extending beyond the rear of the shovel's cab. A 30-yd. capacity surge hopper follows the excavator independently. The hopper is mounted on a 4-wheel chassis equipped with 24.00

A HEIGHT of 325 ft. makes Albiquiu the second highest earthfill dam to be built by the Corps of Engineers. Reservoir capacity to spillway crest is 1,211,000 ac. ft.



x 25 tires. A 150-hp. GM diesel provides power for the vehicular movement of the surge hopper in addition to power steering and the operation of a wide belt projecting from the side of the hopper. This belt is used to fill the bottom-dumps intermittently, while the hopper permits continuous operation of the excavating wheel.

The boom supporting the excavating wheel has a maximum horizontal swing of 180 deg. and has sufficient vertical movement to permit working a face up to 20 ft. high. Since the borrow pit is a large flat area, successive passes of the excavator are made back and forth as the operator controls the vertical and horizontal movement of the wheel. The borrow area is free of large boulders, which makes feasible the use of this ingenious excavator. It has replaced several shovels in the borrow area.

The major borrow area is located in the immediate vicinity of the loading end of the long conveyor belt. The Euclid bottom-dumps make the short haul from the surge hopper to the loading end of the conveyor belt and also the short run from the terminal end of the belt to the dam.

The material from the excavator is dumped into the Eucs which haul to the ramp located at the loading end of the belt. Oversized material is separated by shakers and is discharged to waste trucks through chutes equipped with hydraulic gates operated from the control tower. Acceptable fill is fed to the conveyor belt. The nerve center of this operation is a control tower located high above the ramp. A closed-circuit TV system monitors the loading of the belt and the waste of oversized material.

Two large storage bins are located at the discharge end of the conveyor belt, permitting the separation of fine from random material. The total capacity of the two bins is one hour of belt operation or 2,000 cu. yd. The material is discharged from the two bins through bottom chutes. An arrangement of perforated water pipes below the chute forces the material to fall in curtains not more than 4 in. thick. These pipes are used as a sprinkler system to add the proper amount of moisture for optimum compaction. Again, Euclid bottom-dumps are used in the short haul from the belt to the dam.

The zones of fill of the dam embankment are shown in the typical embankment section. The upstream slope above elev. 6,190 will be protected from wave erosion by 6 ft. of dump rock. Since the semi-arid climate of the region precludes the use of a vegetative cover for downstream slope protection, spalls to a depth of 2 ft. will be used to protect the entire downstream slope except at the service road.

A spillway will be excavated through rock forming a natural saddle about 4,000 ft. from the dam. Due to the great reduction in the spillway design flood effected by the large amount of storage available for control of the spillway flood, a spillway width varying from 80 to 40 ft. only is required. The spillway will conduct flows to a natural canyon section through the abutment formation. This canyon emerges from the abutment about 200 ft. above streambed at which point flows will cascade down the cliff face and merge with Rio Chama about 1,000 ft. below the toe of the dam.

U. S. Highway 84 and State Highway 96 will be relocated around the reservoir area.

PERSONNEL

Contractor

F. K. Mittry, president, Mittry Construction Co.
Joe Famularo, general superintendent
Jack Starkey, project engineer
About 150 employees

Corps of Engineers

Don Wilson, project engineer
A. R. Snedden, chief, field engineer and assistant
Claude W. Matthews, geologist
John B. Rael, office engineer
Jack Richman, materials engineer
Ralph Marshal, inspector
James Michael, inspector
Baxter Deck, inspector
T. Coomes, Materials Laboratory
Felix Castaneda, Materials Laboratory
Russell Baker, Materials Laboratory
Bill Steigel, office clerk

Giant outfall rides rubber rollers

(Continued from page 43)

the pipe. The string was lowered onto the track with jacks and moved up the conveyor line to make connection with the first string. Using the overhead chain hoists on the gantry the pipe ends were picked up. They were aligned with hand jacks on timber blocking, pushing against short studs placed in convenient bolt holes.

When the bolts were set and tightened, pulling the two faces against a previously placed gasket ring, the exterior of the joint was cleaned and thoroughly coated with a hot coal tar. A steel split sleeve was bolted in place over the joint and filled with grout.

After the initial pull, two minor changes were made in the shoreside procedure. The hold-back cable from the power winch was found to be unnecessary since friction of the heavy pipe sliding along the sand was sufficient to keep it from surging forward. The cable was dropped off and a side boom tractor tied into the back end of the string to keep the pipe from rotating and burying the diffusor nozzles as it moved it forward. Tractor easily corrected rotation by applying tension to cable around the pipe.

The angle between the flat-bed and the beach was found to be too steep and the pipe developed circumferential cracks as it made the bend. The two forward roller assemblies were lowered to increase the radius of the bend as pipe moved from rollers to the beach.

Final step in completing the outfall is to excavate a sloping trench beside and beneath the landward end of the pipe to move it laterally about 10 ft. and down about 12½ ft. for alignment with the surge chamber opening.

The contractor expects to salvage virtually all the material used on this job. The timbers will be re-sawn and used for shoring. The steel gantry will be dismantled and re-erected at the firm's Fresno headquarters for handling pipe and materials in the yard.

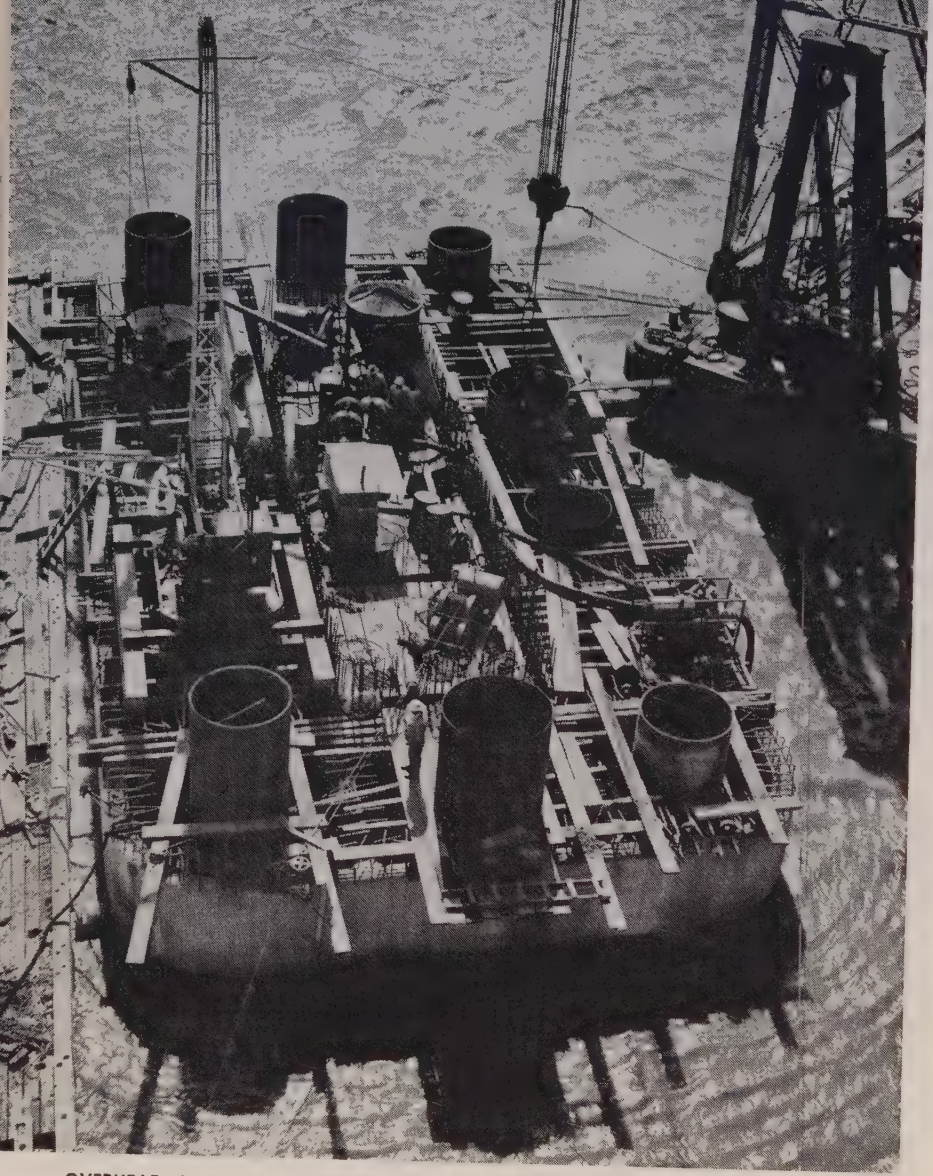
Personnel

For the contractor, Valley Engineers, Inc., Ted Nielson is superintendent, Keith Vicient, project engineer, Tom Flynn and Pete Price are co-owners. For Brown and Caldwell, project engineer is Dan Norris and resident engineer, Charlie Hoage.

Pipe was designed by Harold Bolton, Bolton Engineering Co., San Francisco.

For Smith-Rice, George Mitchell is superintendent of the barge operations.

Sub-contractors included Yuba Consolidated Industries which manufactured the steel pipe, West Coast Painting Co., coal tar and fiberglass application, American Pipe and Construction Co., which applied the coatings, and Laine-Gunite Co., joint coating.



OVERHEAD view of box footing shows drill crew at work, left, while caisson is being placed, right. Ten watertight cells keep structure afloat.

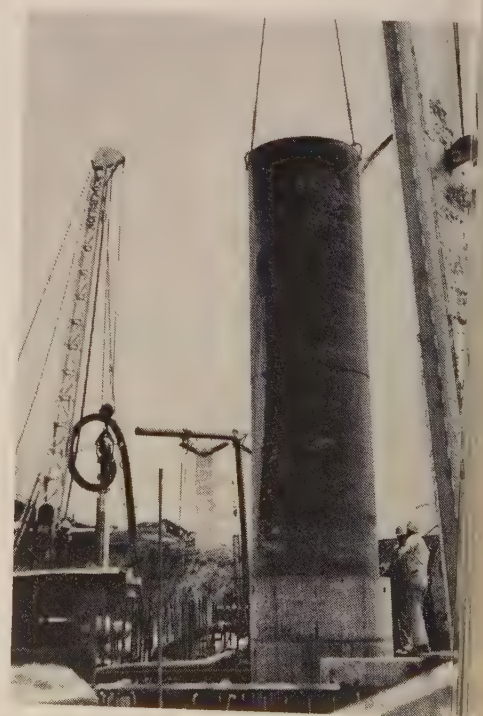
Floating footings for Benicia Bridge

Caisson legs drilled through the mud of the Sacramento River bottom are filled with concrete to anchor unique floating box footings of new high level highway bridge. Compartmented concrete boxes serve as templates and drilling platforms.

NINE BARGE-like floating concrete box footings anchored with concrete-filled steel caissons extending downward as much as 130 ft to bed rock are being constructed to form the foundations for a new high level bridge across California's Sacramento River from Martinez to Benicia, at the upstream end of the Carquinez Straits. The box footings will be used both as floating drill platforms and as templates for the 6-ft. diameter caissons which will be placed through holes in the bottom of the compartmented structures. The foundation design is the first of its kind ever used to support a bridge, although similar methods of thrusting legs or spuds into the ocean floor from a floating platform have been widely used in construction of "texas tower" off-shore drilling rigs and radar stations.

Equally noteworthy is the reverse circulation method devised by the contractor Yuba Erectors, Inc., to drill the holes for the caissons through river bottom mud and into bedrock. Drilling is accomplished with a conventional rotary rig inside a steel casing filled with water well above the level of the river. The hydrostatic head thus formed keeps the mud from pushing into the hole and forces drill tailings into the hollow stem. Mud is removed from the stem with a 1,500-gpm pump.

The Benicia-Martinez bridge is a California Division of Highway



CAISSON shell suspended from derrick barg slides inside drill casing, which will be withdraw

project, authorized under a 1955 bond issue. A deck truss structure on concrete cellular piers, it will be 6,215 ft. long and a minimum 135 ft. above the water at the channel to provide clearance for shipping in the Sacramento River. The bridge joins two promontories on opposite sides of the river which mark the upstream end of the Carquinez Straits and runs parallel to the existing Southern Pacific railroad bridge. (Built in 1928 the S. P. bridge is itself a construction landmark, being the first structure in which the sand island method of pier construction was used.) The new bridge is made of ten truss spans, eight of them 528 ft. long and the two end trusses, one 429 ft. and one 330 ft. Eight plate girder spans form the approaches. In addition to the nine floating box footing piers, there are three conventional land pier footings, two on the Benicia side, and one on the Martinez side, as well as five pairs of concrete piers forming the Martinez approach which will carry the roadway over the railroad.

The river at the bridge site ranges up to 60 ft. in depth and is underlaid by mud varying from 50 to 85 ft. deep. Below this is firm foundation rock. To cut caisson holes through the mud, the State originally proposed a cutting edge on the caisson to be driven and jetted. The double walled cutting section about 10 ft. high would remain in the hole as part of the caisson, requiring construction of a new cutting edge section for each unit. State specifications allowed for modifications, and, as an alternative, the contractor proposed the reverse circulation drilling method which was adopted and is being used.

SUPERINTENDENT Bill Ziegler, right, and Winn Choate, engineer.

The alternate method quickly proved its advantage when the contractor hit several logs imbedded in the mud. These were easily drilled, but would have been difficult to cut with a driven rig.

The Benicia bridge construction project was divided into two contracts, one for sub-structure, and one for super-structure. Both of these were awarded to Yuba Erectors, Inc. Div. of Yuba Consolidated Industries on a combined bid of $14,238,000.

In many ways, the job is ideally suited for Yuba. The firm operates a yard on the waterfront at Richmond where it built marine ways for forming and launching the giant concrete barges. The company owns three barge cranes, one of them a tower crane with nearly 300 ft. of reach and 75-ton capacity, as well as a traveler crane which can be barged mounted. (All of this equipment as well as the yard had been set up for the Richmond-San Rafael Bridge over San Francisco Bay which Yuba forces built in 1955.) At Benicia, about one mile downstream from the bridge site, the company operates a steel fabrication plant where caissons are manufactured and floated to the job, eliminating transportation and supply difficulties.

Box footings

Yuba built 300-ft. marine ways of timber pilings supporting timber skids on a 10% slope at its Richmond yard. On this was set a sled of wedge shaped steel plate girders supporting level wooden deck on which the nine box footings are being cast and launched one at a time. Each of the boxes is 86 ft long, 44 ft. wide, and 25 ft. high. It is compartmented into 18 cells, 13 x 13 ft. Exterior walls are 18 in. thick and partition walls 12

BRIDGE site from Benicia shore shows giant tower crane moored beside first floating footing. Contractor's work dock and conventional bridge pier footing in foreground. Railroad bridge in background was first one built by "sand island" method.

Fischer Construction Company...

Full Speed Ahead to Tinke

...C.I.T. is on the job, too!

Completion of the Tinker Diagonal, on Interstate 40 in Del City, will give Oklahoma City traffic a new high-speed route to the jet facilities at Tinker Air Force Base and the rest of the greater Oklahoma City area.

The Fischer Construction Company of Norman, Oklahoma, has the contract to build seven key structures on the Tinker Diagonal: four overpasses, two bridges and one underpass. This job is just one of Fischer's highway projects through Oklahoma.

Included in the Fischer company's modern equipment fleet is a complete, portable, ready-mix plant. This plant met the need for extensive on-the-job casting for concrete pilings.

"Since 1955," reports partner Raymond Fischer, "C.I.T. has from time to time been instrumental in financing heavy equipment for us and has made wo ing capital loans as they were needed."

How Job-Engineered Finance Plans Help Contractors

Payd Plan equipment financing terms to 6 years w payment schedules related to depreciation, or eq monthly payments up to 36 months, or skip-payme plans where needed . . . these are just a few of t helpful financing tools offered by C.I.T. Corporati

In addition to equipment purchase financing, C.I. can help improve contractor's bid and bond capaci meet current operating expenses or other busin needs by arranging capital loans. C.I.T. represen tives know how to lay out "job-engineered" fina plans carefully devised to fit the needs. Why not or write? No obligation, of course.

This C.I.T.-financed ready-mix plant made it possible for the Fischer Construction Company to do on-the-job casting of over 12,000 lineal feet of piling.

At right: C.I.T. representative Don Reynolds and pa John J. Fischer watch work in progress.

in. thick. Holes are formed in the bottom of each of the corner compartments, as well as six interior cells for drilling and placing caissons. Each hole is lined with a short sleeve of corrugated metal pipe about 2 ft .high and 84 in. in diameter. Holes are sealed by covering them from beneath with shallow steel pressure domes having 4-in. flanges.

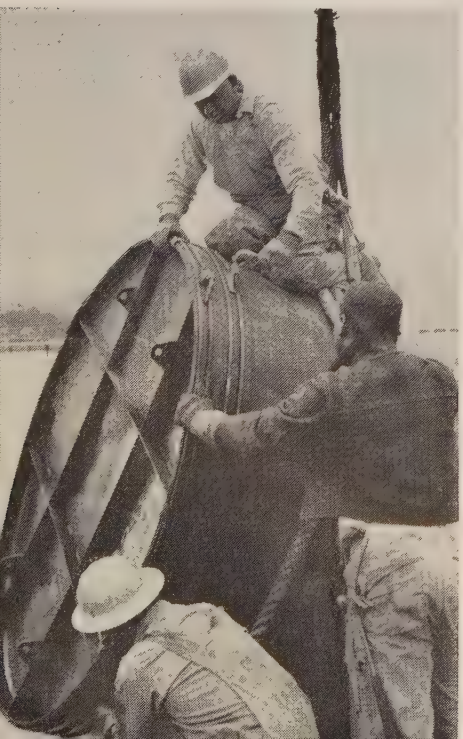
Form work

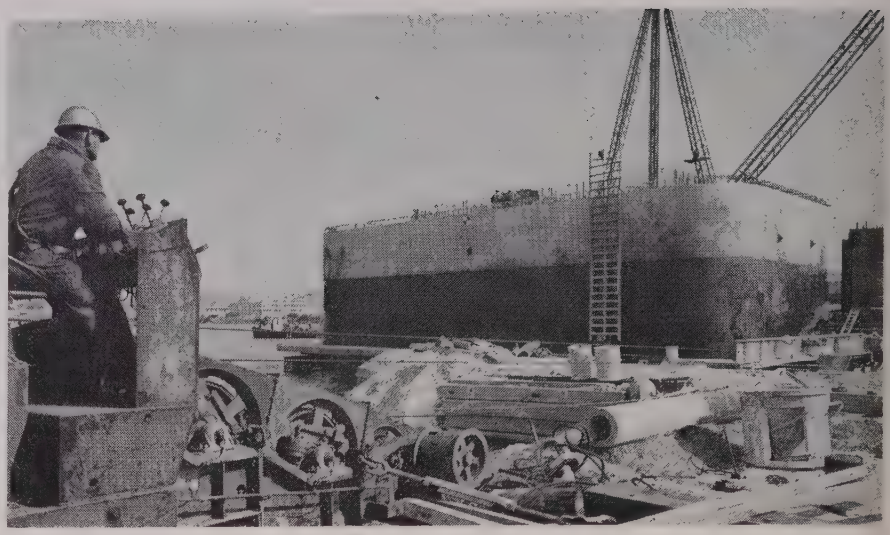
The six compartments of the structure which are not pierced for caissons have simple straight walls which are formed by four plywood panels assembled in a tall square box with four open corners. In place the open corners are covered by narrow steel channels forming the vertical fillets and behind these channels, wedges are driven to expand the box to its proper size. In stripping, corner wedges and interior bracing are removed, the boxes collapsed slightly, and the entire form lifted out.

Cells which will house caissons present a more difficult forming problem since the sides are keyed and lateral reinforcing rods project inside the cell. These are formed by small panels which must be placed and removed individually. The four corner compartments have curved walls formed with curved steel whalers and plywood facing.

Pouring the concrete walls is a difficult operation calling for precise timing, and beset by problems inherent in the size and shape of the structure. The walls are 25 ft. high, 12 and 18 in. wide, and up to 84 ft. long and crowded with a network of 1-in. steel reinforcing bars. The entire compartmented structure must be poured as a single unit without joints.

WATERTIGHT caps removed from caissons floated to job from nearby plant.





BOX FOOTING ready for launching at contractor's Richmond yard. Platform rests on 300-ft. marine ways. Cable drum, foreground, controls speed of descent.

The pour is made from two revolving distributor units of 9-yd. capacity, each covering one half of the box. These air operated distributors consist of a cone hopper, and shuttle belt delivering to a small hopper and rubber spout. They were fitted with four steel legs to span the cells of the floating footings.

The distributor units deliver to 90 sheet metal chutes spotted every 7 ft.; each distributor serves 45 of these placing stations. It makes a complete rotation each hour depositing ¾ yd. at each station to meet a 30-yd.-per-hour schedule. Concrete is supplied by Kaiser Sand & Gravel in transit-trucks.

Vibrating problems

The toughest part of the wall pouring operation is vibrating the concrete. The contractor keeps 18 2½-in. vibrators on the job, 6 as stand-bys and 12 working. Two men are assigned to each vibrator and they have their work cut out for them.

Even so, the first pour took 30 hours, one or two vibrating units were lost and some gunite patching was required to correct vibration deficiencies. The second footing went much more smoothly. It was done in 16 hours and the completed structure had no major blemishes.

If the first pour was too slow, the first launching more than made up for it. To control the speed of the descent, the contractor installed two sets of tackle, one between the concrete abutment at the top of the way and the uphill side of the sled and the other between the downhill side and a steel beam at the lower end of the way. Thus, he could speed up, or hold back the launching process which was expected to take two or three hours.

However, when the sled was cut loose at high tide, the 1,700-ton vessel glided into the water like a greased beaver, floating free only a minute or so after the wedges had been cut.

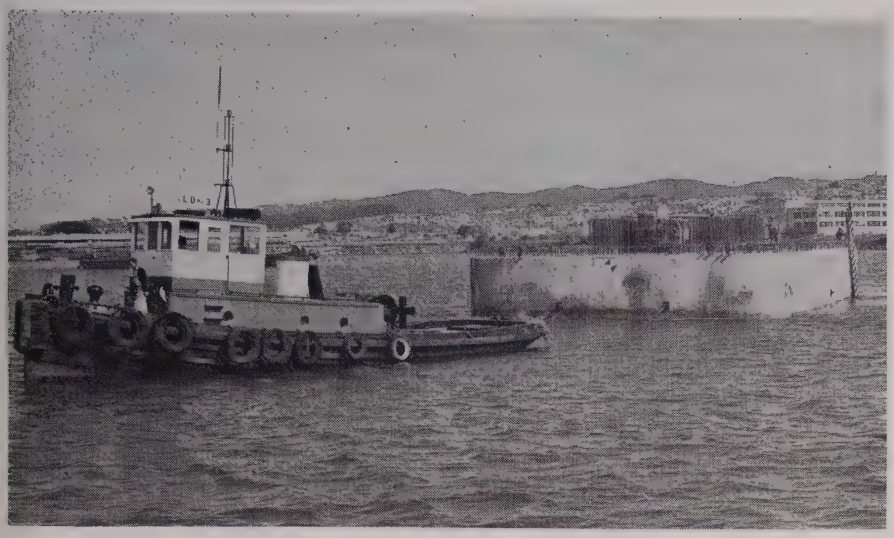
Anchoring the footing

Once launched, the floating box is quickly secured to a tug and started on its journey to the bridge site. The trip takes about 23 hours and is timed so that the big vessel can be hustled through the Carquinez Straits on an incoming tide to nullify the effect of the Sacramento River current.

Next a steel casing 80 in. in diameter and about 50 ft. long is inserted inside CMP sections and allowed to sink to the mud bottom. This casing, like the caisson which is to follow, is constructed at the Yuba Manufacturing fabrication plant across the river and floated to the site. It is rolled from ½-in. plate stock and butt-welded in 8-ft. sections.

Drilling

A rotary drill rig is positioned over the casing. This rig uses a cutting head of 76-in. diameter composed of three lateral drilling arms with carbon chip teeth which form a shallow bell-shaped pattern around a central pilot head. The



TUG hooks on to 1,700-ton vessel (note towing eyes at waterline) floating in bay. Trip to bridge site takes 24 hours. Footing is spotted on incoming tide.

LAND PIER caps formed without falsework using steel frames bolted to stems.

drill stem is 6 in. ID and is connected at the top of the kelly by a flexible hose to a 1,500-gpm. suction pump.

The casing is pumped full of water to a level sufficiently above that of the river to maintain the hydrostatic head necessary to operate the reverse circulation drilling process. As the mud is cut loose at the cutting head, this pressure inside the casing forces the soupy material up through the drill stem into the suction field of the mud pump which pulls it out and discharges the material over the side. The height to which the pump must pull the material in order to get it out of the drill stem was found to be critical and the top of the kelly is kept as low as possible to promote maximum flow. The hole is drilled through the mud and into bedrock to a depth of 3 to 5 ft., depending upon the solidness of the rock encountered.

Permanent caisson

The permanent 72-in. caisson is made of 1-in. steel plate, also in 8-ft. sections and also rolled and welded at the nearby Yuba plant. At the plant completed sections are fitted with steel end-plates attached by short rubber sleeves which are clamped in place with steel bands. This creates a water-tight vessel which can be towed across the river.

The caisson is picked up from the water, end-plates are removed, and is carefully installed inside the drill casing, and sunk into its socket in the bedrock. This is a difficult process since it is carried on from a floating platform subject to action of the tides and river currents. It has about 3-in. clearance between the caisson shell and the sides of the hole and must be set within 1% of vertical. Once the shell is set in its rock bed, the voids are filled with fine sand, using regular concrete bucket attached to a small hopper with a long flexible fabric spout. The flattened end of the trunk is stuffed into the narrow space between the caisson and the drill casing and carefully worked around the perimeter. Then the drill casing is carefully pulled out.

Next the drill rig is set back over the hole, and, using shortened cutting blades, it drills a 5-ft. diameter hole into the rock 5 ft. below the bottom of the caisson. After inspection by a state diver a spiral-wound reinforcing steel cage about 20 ft. long is placed at the bottom of the anchor hole and the caisson is filled with tremie concrete. The underwater concrete mix is standard 6-sack Class A concrete with an additional 10% cement added.

Concrete is prepared in a Noble batch plant set up by Kaiser Sand and Gravel on the Martinez side about a half mile inland. It is delivered to the contractor's work dock in transit-trucks and ferried out to the footing by LSM's, each carrying two 4-yd. buckets.

Caissons are filled up to about 6 ft. above the bottom of the box footing. At this point the footing is still floating completely free of the ten caissons projecting up into its compartments (8 in. in the two end piers). The next step is to attach this 1,700-ton vessel to its permanent legs.

Heavy steel beams are set across the tops of the four projecting corner caissons and beams are tied into the footing with hanger rods, and the six watertight cells in the box footing are filled with water to give the structure negative buoyancy and hold it firmly in position. The 20-ft. sections of corrugated culvert pipe are detached from their stubs, special rubber seals are installed by divers to close off the hole in the floor of the footing through which the caisson protrudes. With the seals in place, the cells are dewatered and filled with concrete to a depth of 15 ft. Water ballast is pumped out simultaneously with pouring of the concrete so that a relatively uniform load is maintained.

The structure is decked with an 12-in. slab and slip-forms are set up to pour the pier shafts. These also are of cellular construction and are actually a continuation of the line of four compartments in the center of the box footing.

Personnel

For the contractor, Yuba Consolidated Industries, Inc., H. W. (Bill) Ziegler, is project superintendent; Bill Brown, assistant superintendent, Al Tokola is chief engineer; Jay Murphy is project coordinator; Winn Choate is field engineer. Rod Chisholm is superintendent of the Richmond casting yard; Bob Becker, footings superintendent; M. C. Brown, pile buck foreman; and Frank Wilson, labor foreman. John Darby is field engineer for the firm of Earl and Wright, consultant engineers for the contractor.

For the California Division of Highways, State project engineer is L. C. Hollister. Resident engineer is Oscar A. Johnson and Wallace Ames is assistant resident engineer. The piers were designed in the Division of Highways Bridge Department. Project designer was R. D. Sunbury.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Owners and operators testify that this tractor shovel outperforms and outproduces larger, more costly machines

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perator Says: "I like the H-120 better than anything I've er run. It's faster, comfortable and easy to handle. The lance is perfect and the safety and visibility is tops cause of the lift arm design. The high lift and long reach me center loads in gondolas of rail cars."

Owner Says: "The additional capacity of the H-120 and its faster load-out speeds has cut our basic hauling equipment needs in half on the pit-to-plant short haul operation. The high reach of the bucket gives evenly distributed loads which makes it easier on the hauling equipment."

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Superintendent Says: "The better balance, speed and maneuverability of the H-120 makes it a better buy than larger competitive models tested on the job."

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You must see the H-120 in action to appreciate its outstanding performance — how it can put out big yardage so easily. With buckets from 4 to 8 cu. yds., more horsepower, higher dumping clearance (10'10"), longer reach (3'6") and many other superior features it is the big news in tractor-shovels. See your Hough Distributor today, or return the coupon.

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Problem of city street trenching solved by —

Drill for placing service pipes

LOWERING the local-built drilling machine into position to install a service connection. Frame is long enough to take the drill and shield, plus a 5-ft. length of cement-asbestos pipe. Powered by gasoline engine, the drill advances as 5-ft. pipe sections are added.

A most common problem of city street maintenance is the trenches required for installing or replacing house connections. This is particularly true where an older section of a city is being sewered, requiring cross-street trenches for every house. Such a situation was presented in a 93-mi. sewer system installed in a suburban area at Klamath Falls, Ore., and an ingenious pipe-laying drill described in this article represented the unusual solution to the problem. Editor

CONNECTING 3,200 homes to a new sewerage system for a suburban area of Klamath Falls, Ore., represented a major problem with more than 60 mi. of mains, laterals and connections. No alleys were available and the laying of each lateral required trenching across the street for each residence, with attendant problems in public relations, as well as the work involved. A unique pipe-laying drill to place these service connections was developed by Maurice Gunderson, project manager for the sanitary district. To drill and lay pipe a distance of 25 ft. under the street, it averaged ½ hr., eliminating trenching and much subsequent work in street repair.

General project features

Formed after years of political wrangling, the South Suburban Sanitary District voted $1,800,000 in bonds in 1958. The project was to provide sewerage for 3,200 homes in an area where the population increase averaged about 100 homes a year. Engineering designs for the project were prepared by Cornell, Howland, Hayes and Merryfield, consulting engineers of Corvallis, Ore.

The work involved 62,335 ft. of mains, 176,665 ft. of laterals, and district crews would install about 100,000 ft. of 4-in. service lines. Concrete pipe was specified for mains of 19 to 36-in. size with concrete or asbestos-cement pipe for the 8 to 18-in. sizes. Designs permitted concrete, asbestos-cement or clay pipe for smaller sizes. More than 600 precast manholes were required.

Part of the project involved four crossings of an irrigation canal which extends through the district from Upper Klamath Lake.

At each of these crossings, a 12-in. asbestos cement pipe was laid and encased in concrete, connecting between precast manholes. These crossings represented considerable construction difficulty, but that is a different part of the story.

Prime contract was held by Lee Hoffman Inc., Beaverton, Ore., who subcontracted mains, laterals and manholes to Kenneth Nelson Co., Pasco, Wash.

Problem with chalk

Most land under the area is underlain with a stratum of chalk. This condition, possibly peculiar to the Klamath Falls area alone, provided expected benefits and some unanticipated problems in construction. Because the chalk normally maintained consistency, no shoring was used.

The layer appeared at various depths, ranging down from a minimum of 2 ft. below the surface. It excavated easily, but stood perfectly. Above the chalk, in some parts of the district, soil was sandy and wet. If the chalk layer was 6 to 8 ft. below the surface in a sandy, watery area, considerable sloughing and caving of the ditch banks resulted. Nevertheless, Nelson's crews, having experienced considerable success with unsupported chalk walls, were tempted to go deeper in the hope things would get better.

A notable example of things getting worse occurred on Homedale Road, a suburban street heavily traveled as a through artery and liberally lined with homes. On this street pipe was laid in an approximate 8-ft. cut. Caving lost as much as 50% of the adjacent 21-ft. street. Water and sand above the chalk were too thick to pump and too thin to shore.

In several cases, construction crews found they had dug a miniature trench 8 ft. deep and 35 ft. wide. One weekend a side caved and broke a 4-in. water main. This flooded the hole, and the business was referred to as "Lake Homedale." It took almost a day to pump the 300-ft. hole dry.

On three other streets, conditions were as bad. A crater de-

veloped across 40-ft. Leland Drive that reached from property line to property line. "The entire street was in the ditch," Gunderson said.

Public relations problem

Almost all mains, laterals, and service lines were laid parallel to streets, in front of homes. Only one small subdivision had back alleys. In addition, many streets were what Oregon law calls public roads—streets built and maintained by property owners. These streets had gravel surfaces, or they had no surface at all. These two conditions, no alleys and few paved streets, contributed troublesome, expensive problems for the district. They provoked the directors' most painful headache, poor public relations.

Contractors' crews and district crews alike dumped ditch dirt on road surfaces as they worked down a street, because they had no place else to put it. When dirt was replaced, gravel went in the ditch with it. Chalk residue stayed on the road surface. In dry weather chalk blew into swarms of dust and caked to an extremely slippery surface in wet weather. Complaints were loud and vigorous. The district did what it could. At minimum expense it pieced together a thoroughly adequate tank truck and sprayed streets during fall and summer months. It laid tons of gravel on streets and driveways to cut down slickness. Some gravel was used on streets that had no surface before.

The eventual answer was a street-by-street reconstruction program. The district contracted with the county to buy gravel and to hire county men and equipment for most of the work. When that job is entirely completed, many streets will be in better condition than they ever had been before.

Trenches, and pipe-layer

The street repair project included paved streets, many of them traffic arteries through the suburban area.

Trench cuts across streets were numerous. These racked motorists' nerves and sharpened tempers. They necessitated detours when trenches were open, and caused annoying bumps when cuts were covered with temporary patching. The problem, however, was greatly reduced by the ingenious machine developed by Maurice Gunderson, project manager.

IN OPERATION, the drill is advanced by turning on the tractor steering-wheel, as shown. Water is pumped into the drill head to remove cuttings.

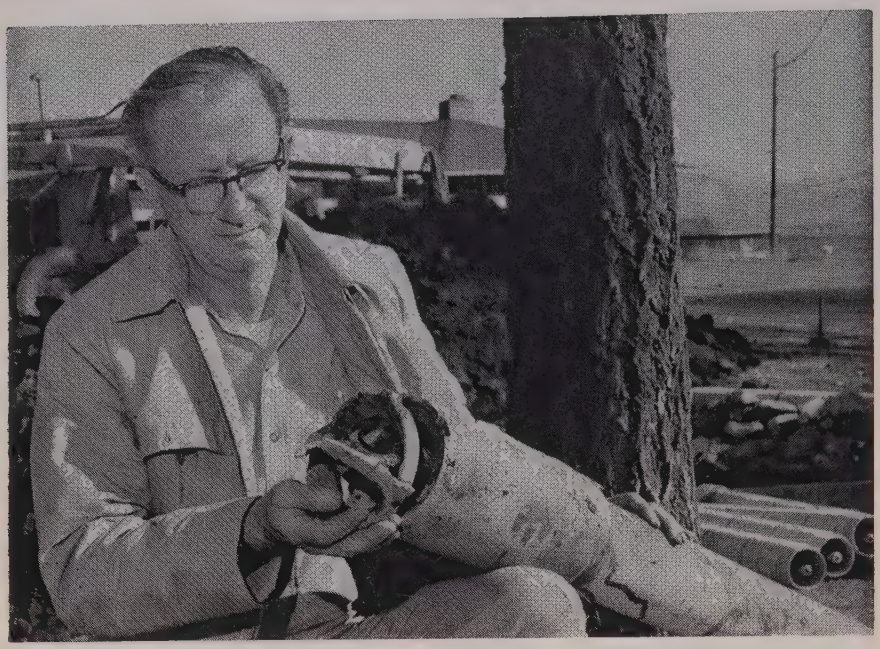
LOCKING ON another section of pipe, and extending the drilling shaft. In ordinary soil the drill placed a service pipe under a 25-ft. street width in about ½ hr.

Gunderson's pipe-laying machine eliminated cross-street cuts on all but the widest roads. It minimized complaints, saved time, and reduced expenses. The device is a drill, like an elaborate brace and bit. It drills the hole and installs the cement-asbestos pipe simultaneously—when the hole is drilled, the pipe is in place. This is possible because a 5-ft. steel auger is fitted inside an initial 5-ft. section of pipe. It is reported to be the first such combination tool for pipe-laying.

A 9-hp. gasoline motor powers the auger's rotary movement. Forward movement along an 8-ft. track is transmitted by a chain drive. The drill is advanced by a workman turning a tractor wheel steering arrangement.

Drilling procedure

To begin operation, the machine



MAURICE GUNDERSON, project manager for the South Suburban Sanitary District, examines a drill removed from its metal shield. Unit has a slightly larger diameter than the service pipe. Design of the cutting head of the drill was the key to this time-saving process.

Selected unit bids—Klamath Falls sewer system

(1) Lee Hoffman, Inc.	$1,387,447
(2) E-W Construction Co., Eugene, Oregon	1,474,182
(3) Valley Engineers, Fresno, Calif.	1,865,022
McGuire & Hester, Oakland, Calif.	2,270,876

		(1)	(2)	(3)
TRENCH EXCAVATION AND BACKFILL—18-IN. PIPE				
0 ft.- 6 ft. deep	lin. ft.	$ .90	$ 1.05	$ 1.95
6 ft - 8 ft. deep	lin. ft.	1.20	1.35	2.20
8 ft.-10 ft. deep	lin. ft.	1.50	1.75	2.50
10 ft.-12 ft. deep	lin. ft.	1.90	2.10	2.80
12 ft.-14 ft. deep	lin. ft.	2.40	2.95	3.35
14 ft.-16 ft. deep	lin. ft.	3.20	3.75	3.85
16 ft.-18 ft. deep	lin. ft.	5.00	5.70	6.40
18 ft.-24 ft. deep	lin. ft.	7.50	9.45	11.00
Gravel Backfill	cu. yd.	2.40	4.40	3.50
Rock Excavation	cu. yd.	25.00	16.80	15.00
Concrete Backfill	cu. yd.	41.00	26.25	50.00
CONCRETE SEWER PIPE IN PLACE				
8 in.	lin. ft.	1.75	1.70	1.80
10 in.	lin. ft.	2.20	2.10	2.05
12 in.	lin. ft.	2.70	2.65	2.50
15 in.	lin. ft.	3.60	3.60	3.70
18 in.	lin. ft.	4.90	5.05	5.30
24 in.	lin. ft.	8.50	8.95	9.00
30 in.	lin. ft.	11.00	11.00	12.20
36 in.	lin. ft.	14.00	14.20	18.15
REMOVAL AND REPLACEMENT				
Concrete Pavement	lin. ft.	3.10	3.15	6.00
Asphalt Concrete Pavement	lin. ft.	2.50	2.10	2.50
Gravel Resurfacing	lin. ft.	.30	.26	.35
Concrete Curbs	lin. ft.	5.00	2.65	10.00
Concrete Sidewalk	lin. ft.	5.00	2.65	5.00
Oiled Wearing Surface	lin. ft.	2.10	1.60	1.25
Driveway Culverts	lin. ft.	2.60	1.90	3.00

is placed in a hole beside the street under which the drill will cut. A smaller hole is dug directly across the street to receive the auger and pipe. The machine's base track is lowered to the level of the pipeline and a 5-ft. section of auger-inside-pipe is locked into place. The gasoline motor is started and the auger-pipe section bores forward. A leading steel shield guides and supports the cutter, the shield being of slightly greater diameter than the pipe (see picture).

When the first 5-ft. section is drilled, the machine is stopped and another section is locked to it, and the process starts over. The auger continues to turn inside the pipe, regardless of how many sections are added. The job is finished when the first section breaks through the other side of the street. Then the auger inserts are removed, and the pipe remains solidly in place.

Water is pumped into the bore as the drilling moves forward to keep waste material in solution and to prevent clogging.

Gunderson found the greatest problem in development was designing a bit that would not clog. The final answer proved satisfactory in chalk, clay pockets, hardpan, sand, and all other materials encountered by construction crews.

Aside from the gasoline motor and the water pump, the machine was pieced together from sections of steel angle bars, chain belts, drive shafts, and other miscellaneous scraps. It was built by Fred Lewis, chairman of the sanitary district's board of directors, who operates a metal fabricating plant.

In ordinary soil the machine drilled and laid pipe under an average 25-ft. street in half an hour, a considerable saving over the 2½ to 3 hr. required to dig a trench, lay a line, and refill the trench. The greatest saving, however, was in eliminating subsequent street repairs. This alone saved the district, by Gunderson's estimate, $20,000.

These construction problems and answers principally concerned the laying of the sewer lines. Hoffman, the prime contractor, experienced relatively little difficulty with the oxidation ponds and pumping stations. Engineers had designed an arrangement of four ponds at graduated elevations in which effluent is treated before being discharged into the nearby Klamath River.

The four ponds formed by earth dikes cover only 125 ac. of a 305-ac. site that once was a tule swamp unsuitable for farming. Ponds are free of offensive odor, and their water is sparkling clear. The system is the largest on the West Coast using 100% oxidation pond treatment. Clarence Cuyler, former assistant chief engineer for the Oregon State Sanitary Authority, said after a visit that the system was the most satisfactory sewage disposal unit operating in the state.

For the contractors, Kenneth Nelson and Art Carson were the superintendents. Warren Hannah was office manager.

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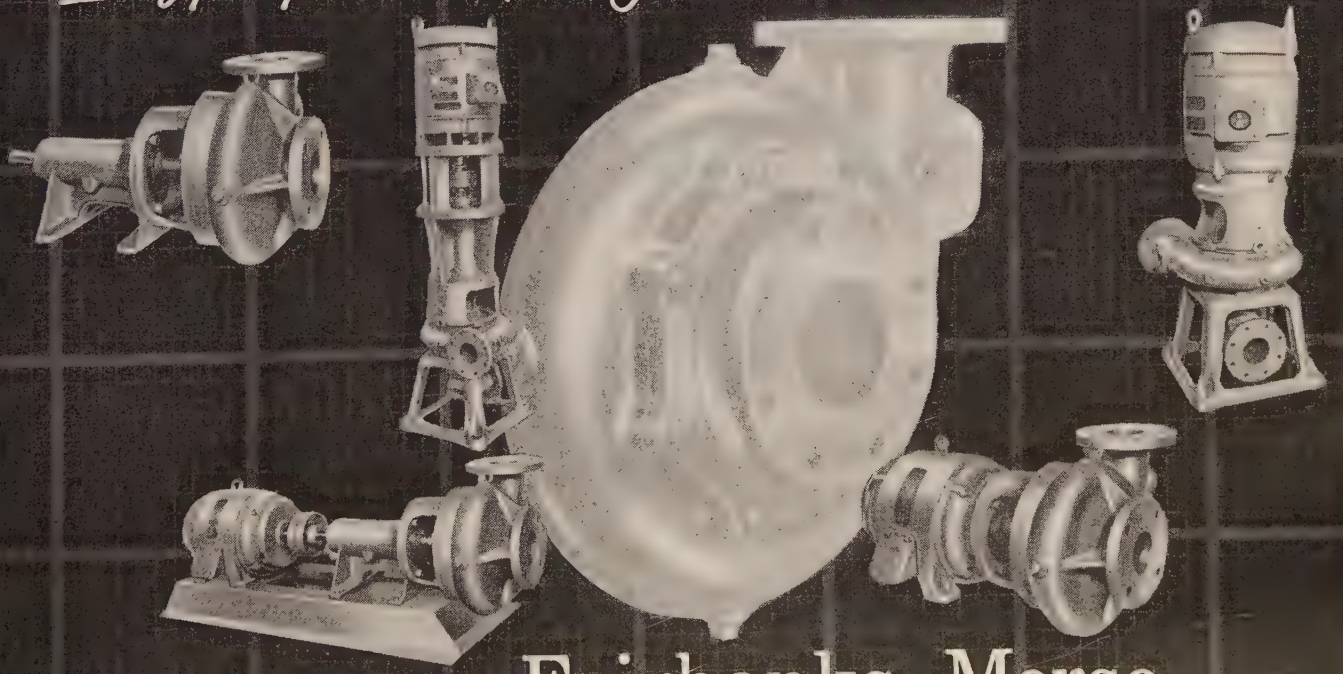

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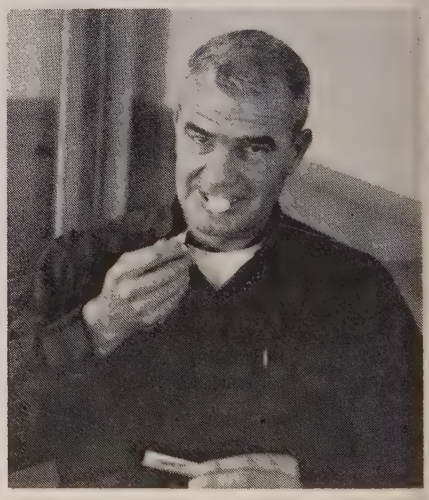
BOXCAR bridge uses steel underframes on concrete piers to support a concrete deck. Railing is made of surplus landing mat.

The strange and wonderful bridges of San Benito County

How a thrifty road commissioner in a mountainous, thinly-populated area stretches his county's highway dollars



COMMISSIONER E. R. HANNA

SAN BENITO County is a pleasant anachronism in the coastal mountains of Central California. Located about 50 mi. inland from Monterey Bay, the county encompasses 1,400 sq. mi. of rugged hill country on either side of the narrow and usually dry San Benito River. The area is rich in early California history, as well as in scenic attractions, including the Pinnacles National Monument, a region of jagged stone teeth upthrust against the sky.

About 95% of the county is mountainous and devoted primarily to cattle grazing. The remainder, the flat fertile northern end, is an irrigated farming and orchard area surrounding Hollister, the county seat.

The population explosion which has sent new millions into other areas of California is pretty much of a dud in San Benito County where the population stands at 15,000, an increase of about 45% in the past 15 years.

The county's wealth of historical site, scenery, and good grazing land are riches indeed, but they don't maintain the 420 mi. county road system or build the bridges necessary for the scattered citizens to get to town.

For this county relies on still another asset, the ingenuity of a whimsical ex-Marine named Ed Hanna.

In the 14 years since he was installed as County Road Commissioner, Hanna has built bridges out of box cars, underframes, sideframes, surplus hatch covers, old rails, landing mats, and surplus Navy floating fuel tanks. After years of cruising San Francisco junk yards and used railroad material emporiums for steel to replace sagging and weary county spans, he has developed a junk iron stockpile of his own and is now building bridges out of old bridges.

Hanna's unorthodox structures are only part of his highly unusual and effective approach to a conven-

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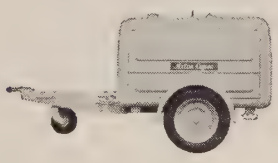
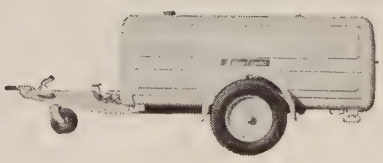


VT6 Compressor
Weight: 3,950 lb. • 315 cfm



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tional problem, the simple shortage of money. With a modest $350,000 annual budget, the San Benito Road Commissioner faced the problem of maintaining and building roads throughout his 420-mi. system and working his way through a backlog of some 50 decrepit and ailing bridges. Work was, and is programmed toward the County Road Department's long range objectives. The current goal is to make it possible for every child in the county to get to school, regardless of the weather or depth of run-off water in the numerous seasonal streams that vein the county. The more distant objective is to create all-weather roads which will enable every rancher in the county to get to town without, as Hanna says, "having to ride part way on a tractor."

Progress towards these goals is not assisted by the terrain which is uphill in every direction nor the climate which renders the eastern part of the county as dry as a temperance picnic. Further, what water there is has such a high sulphide content that it is corrosive to concrete.

Despite natural obstacles and limited budget, however, Hanna will soon have all the county kids on their way to school and it won't be very many more years until their parents can drive to town regardless of the weather. The Road Department has replaced all 50 of the unsafe bridges and built a number of new crossings as well. In cooperation with local ranchers, they have also built 15 foot-bridges in areas which do not have traffic to justify construction of a vehicular bridge.

In the course of this program, Hanna and his 27-man road crew have learned to squeeze a dollar until the green ink runs like pickle juice.

Bridge building

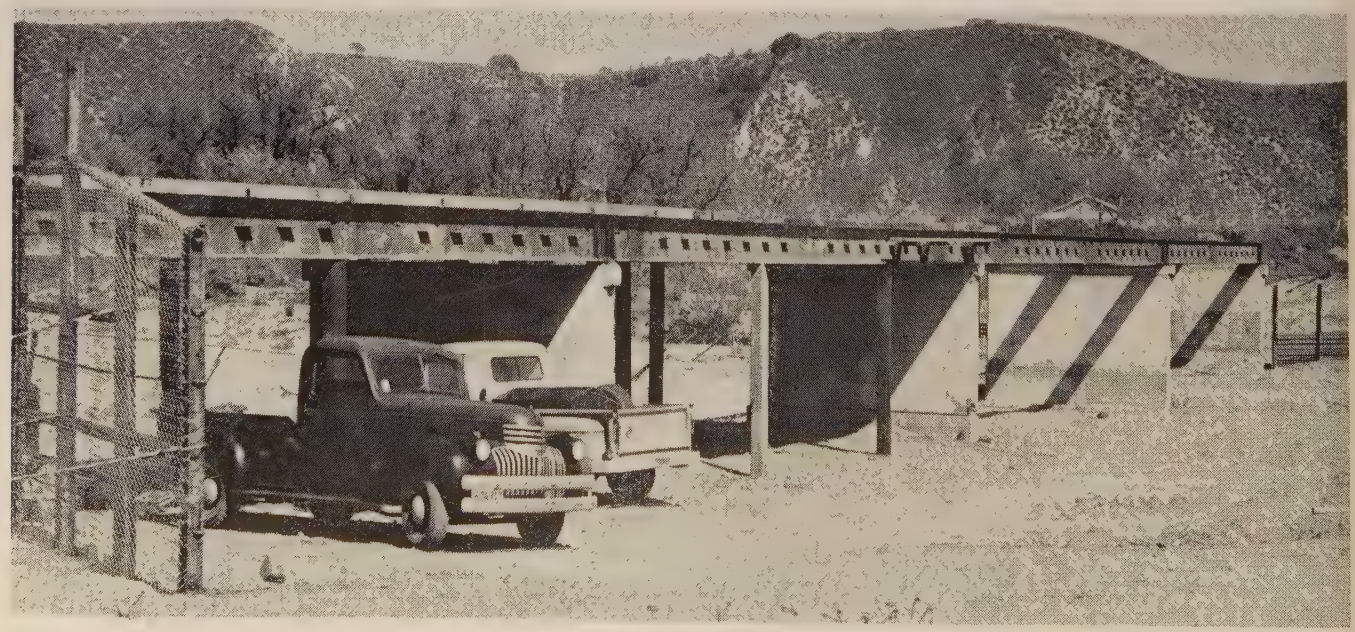
An oustanding example of bridge building economy is a 200-ft. steel and concrete structure about 50 mi. south of Hollister known as Murphy Bridge. Its five 40-ft. spans are made of boxcar underframes converted to bridge girders resting on concrete piers. Each pier sits on ten 30-ft. steel rails driven into the stream bed. Wingwalls of the bridge are formed with vertical steel rails backed by sections of landing mat, and strips of steel landing mat welded to steel uprights to form the railings.

The bridge is erected over a paved ford which had to be broken up before the piling could be set. The pavement breaking and pile driving was done by a local contractor whom Hanna had persuaded to buy a surplus drop-hammer which the contractor could operate with his truck crane. Pier erection and steel work was done by the county using local part-time labor whom Hanna says are all highly skilled and versatile workmen. Concrete decking was placed by a local cement contractor. Total cost of the bridge: $21,000.

In the years immediately following World War II, when county bridges were falling at the rate of two to three a year, Hanna built new bridges out of everything but coat hangers. At a number of points, he installed surplus Navy fuel containers made up of several rectangular steel cells linked in train by a truss-like channel steel framework. These were reworked to form a single unit 90 ft. long, 15 ft. high and 9 ft. wide. The unit was set into chair-like concrete abutments by snaking it out over the gap on steel cables, then slacking off on the cables to lower it into position. Additional steel members were placed at the sides to expand the roadway to 15 ft.

Steel from the bridges which were removed was carefully hoarded. Trusses were often shortened to increase their load carrying capacity and reinstalled. Other steel members were stockpiled, and this stockpile is now paying off in Hanna's most recent construction project.

This is the Cienega Road Bridge now under construction. It is a 175-ft. structure over the San Benito River (a dry wash at this time of the year). The bridge uses three continuous I-beam stringers weighing 92 lb. per ft. They cover 4 spans, two of 37½ ft. and two of 50 ft. and are supported by reinforced concrete piers, imbedded 8 ft. below the stream bed 30 ft. in total height. Each pier rests on 18 steel rail piles and each abutment on 12 piles. The stringers are made up from Hanna's steel stockpile, individual pieces being butt-welded and spliced with fish plates to provide the 175-ft. length. Steel work and pier construction again is handled by a labor force of local ranch-



STEEL from several old bridges was salvaged to make the three 175-ft. continuous girders of this new structure over the San Benito River. Wing walls of left abutment are steel rail and wire mesh anchored by cables to concrete deadman.

Needed: 190 tons of 3/4" minus aggregate per hour

New Diamond Plant Gets Job

When Frank Strausberg & Son, Saginaw, Michigan contracting firm, was awarded a contract for aggregate for asphalt surfacing and shoulders on State Route 57, it needed a crushing plant that had plenty of capacity and portability. Diamond Iron Works sales engineers were called in and asked for their recommendations.

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ers, while the concrete deck is done on contract.

Wingwalls for the structure employ the familiar steel rails, but Hanna says that surplus landing mats have now become too expensive so he has switched to wire mesh. The embankment approaches for the bridge will be built later by another rancher-contractor who owns a small scraper.

Footbridges

The Road Department's footbridge program includes two suspension bridges, and a number of truss type bridges made from the steel side—frames of box cars. Erection of the truss bridges has become practically an assembly line operation, Hanna says. Steel channel side frames are made up in truss units about 17 ft. long and 10 ft. high. These are assembled into a complete span of the desired length. Two sets of these side frame assemblies are joined by steel cross members. The upper cross pieces are set about 4 ft. down from the top of the truss. A wooden walkway is fastened to these cross members, thus the side trusses form both the bridge support and the hand rail, and the entire structure is assembled as a unit.

Road building operations

San Benito County is bisected by State Highway 25 running the length of the county, roughly north-south. Another state road, 156, cuts a deep arc through the northern portion, crossing 25 at Hollister and forming a crude pitch fork shape. The county road system which supplements these two state routes includes a long loop through the remote area to the south as well as numerous feeder routes in the more populous area.

COUNTY road paved with heavy single armor coat of MC-5 at .25 gal. and crushed screenings at 28 lb. per sq. yd. over a regular MC-1 or MC-2 seal coat.

About 45% of the operations budget is devoted to maintenance and 55% to new construction. Most of the new construction is composed of resurfacing, straightening curves, and bringing the geometrics up to state standards. The split in highway money is based on the county's experience that the deterioration of roads during a normal winter will require about 45% of the available money to repair them. The county is divided informally into five areas, each served by a motor grader and operator who lives in that area. The operator doubles as district supervisor, construction foreman, maintenance foreman and whatever titles could be applied to a one-man gang. Each operator is supplied with a pickup truck equipped with two-way radio, hand tools, a 120-gal. fuel tank and lube equipment for servicing the motor grader.

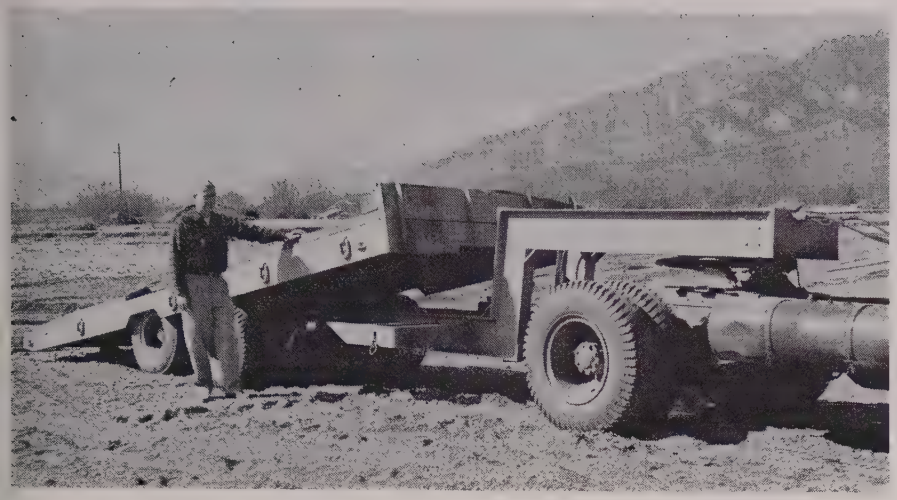
With his pickup truck tender, the operator in each area can function independently of the County Road Department headquarters outside of Hollister. This represents tremendous savings in time and transport costs over a centralized system of keeping all the equipment at headquarters and dispatching it to the various jobs, which may be as much as 100 mi. away.

Most of the grader operators have worked for the county for 20 years or more and they are the key men in Hanna's organization. Each operator is authorized to buy parts for his machine and small supplies as needed. He can hire local labor for small jobs. During emergencies such as flood or washout, he can throw the budget out the window and make whatever expenditures are necessary to get the job done.

A large share of the new construction is in resurfacing lightly-travelled back roads and in these routine jobs, the grader-operator again acts as the job foreman.

Trucks deposit a lift of bank gravel ranging from 7 to 9 in. thick on the rough graded road at the direction of the grader-operator. This is spread and lightly compacted and the road is ready for service. Timing of the following operations is governed by the amount of traffic on the road. It may be left for a year or so to be further compacted by traffic, or, on more heavily travelled roads, it will be completed during the next winter season, when the crew will apply an additional 3-in. lift of gravel. This is done during the winter months to take advantage of the rain to aid in compaction, particularly in the southeastern sections

FOOTBRIDGE made of boxcar sideframes welded to form through truss. Road Department builds these in isolated locations where traffic doesn't justify a highway bridge.



TILT-bed trailer with gooseneck and fifth wheel added at County shop enables one tractor operator to load and transport his machine.

LANDING mat and steel rails were standard for wingwalls until mat price went up.

of the county where the water supply is meagre often necessitating long tank hauls of water for compaction. Subsequent stages may include a seal coat on roads where traffic warrants it.

Heavy traffic routes are paved with an armor coat consisting of a preliminary application of MC-O,1 or 2 followed by an application of MC-5 at the rate of .25 gal. per sq. yd. Over this is placed 28 lb. of crushed screenings per sq. yd.

Paving is a minimum of 24 ft. wide with 8-ft. shoulders to allow for future growth. Selection of road construction projects and type of surfacing is based on traffic surveys which the county conducts every three years using college students and part-time workers to man 120 stations.

Showcase in the county road system has a 6-mi. stretch of what is now State Route 25, which was built by the county over a gun barrel strait new alignment during a 6-year period. The road was kept open from the time cut-and-fill operations were completed and a lift of wearing gravel applied.

Cost accounting

Through the years the Road Department has evolved a schedule of daily costs for virtually every operation and every piece of equipment. These costs accurately reflect a proportionate share of maintenance overhead, insurance and other hidden costs.

An example is basic labor cost figured at $22 per day per man. This is arrived at by taking the base salary of $4,800, adding cost of compensation, insurance, health insurance, and retirement contribution to give a total cash cost of $5,179.20 per year. This figure is divided by 260 annual working days, less 10 days vacation, 7 holidays and an average 4 days sick leave, or a net of 235 days. Dividing 235 into $5,179.20 gives a $22.00 daily cost per man. To the base figure the county adds about 15% to cover total yard costs including such items as paint, nails, bolts, flares, rope, hand tools and barricades.

In a similar fashion all the costs relative to operating a piece of equipment are computed and divided by total annual working days to arrive at a daily operating cost. Equipment cost figures do not include depreciation, since equipment replacement is considered a capital outlay and is separately budgeted.

Further refinements of these daily costs of labor and equipment have enabled the Road Department to develop cost schedules for related operations, so that gravel hauling, finishing road bed, oil and cover, and other functions can be computed at a flat charge per day. Schedule of individual operations, with operator except as noted, include:

Screening plant without operator	$15
Wheel tractor	34
Rollers	49
Broom, including pickup	34
Air compressor without operator	12
Water pump, trailer mounted	6
Athey loader	53
Tractor loaders	42
Bulldozers with pickup	40
Motorgrader with pickup	37
Transport truck	48
Water truck	32
Small dump trucks	32
Large dump trucks	41
Laborer	15
Laborer (1st grade)	18
Foreman with pickup	23
Superintendent with pickup	25
Gravel	.12 per yd.
Creek gravel	.06 per yd.

Asphalt is figured at $35.00 a ton, screenings processed by the county at .50 per ton, 12-in. culvert laid in place at $4.00 per ft.

Combination or job costs include: Move in and move out, a flat charge of $200; screening plant, $300 to move in and $136 per day operations.

Gravel hauling including screen plant operations is figured at $436 a day in place and rolled. Finished road-bed operations, $236 per day; oil and cover, $360 per day; and hauling screenings which covers loading the trucks and moving the material to the job, $206 per day.

Equipment

The fundamental records on equipment operation, fuel, maintenance, repair costs, and annual hours of operation have enabled Hanna to effect a number of economies in his equipment fleet. When he took over in 1946, the county operated 6 motor graders with 5 on regular duty and 1 as stand-by. He increased the number of hours of operation from 800 to 1,200 per year for each of the 5 regular motor graders, extended their service life from 10 to 12 years, and disposed of the sixth grader.

Annual operation hours were increased by providing the operators with pickup trucks carrying fuel and supplies such as signs and barricades. In this way the grader could stay in the field for a longer period of time and the operator could work a full day's shift without having to stop while the crew placed barricades and cleaned up during the last 30 minutes of the shift.

For a cost accounting whiz and an organization man, Hanna looks anything but the part. A tall tanned man with grey crew cut hair, his customary uniform is khaki

(Continued on page 140)

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GRAPEVINE personnel include Ted Jones, project superintendent, Red Bentley, master mechanic, and Max Farrington, Koehring Co.

MODERNIZED Formgrader has hydraulic steering and elevation, and automatic controls. Fork, right, follows grade wire controlling depth.

stages were paved with conventional spreads based on two dual-drum mixers. For the third, snake-like stage, the contractor moved in a new Koehring Tribatch, marking the first time this triple-drum machine was used on a Western highway job.

Rough conditions

Construction men agree that there could hardly have been a more rugged proving ground devised for the new unit. Built-in restrictions included the grade, 6% all the way, continuous curves, cramped site, and large volume of stiff concrete. The roadway was paved in two 24-ft. lanes, with the left hand lane 8 in. thick and the right lane 10 in. The extra two inches were added on the right to offset the increased pounding from trucks pulling up the grade.

The 8-in. lane was paved first, with the Tribatch and its string of batch and water trucks traveling on the grade beside the headers.

The paving train included a Blaw-Knox spreader, a Lewis leveller and Lewis finisher. As the spread moved into the curves, it was necessary to add a motor grader to flatten out the super-elevations to give batch truck and paver a relatively level spot to work in, and to rebuild the original grade when the paving string passed. Original elevations were so steep that batch trucks were in danger of toppling over as they backed into the skip. On the second 10-in. lane, the paver worked from the previously poured slab.

The Tribatch is an automatic machine with operation of the skip, timing of the batching and transfer, and water injection and amount controlled in sequence by pre-set automatic switches. As a safety measure, the skip will not raise until the skip tender presses a release button mounted at the end of one of the guard rails. A second button permits him to stop the skip in any position. The machine operator controls manually the movement and dumping of the concrete car and forward movement of the machine.

Considerable down-time was encountered as the steady 6% grade exacted its toll on all parts of the spread. This included numerous breakdowns of batch trucks, and considerable maintenance on the spread travelling the headers.

Despite mechanical difficulties, the paving spread made good progress. There were no runaways or serious accidents.

Innovations

The job is notable for a number of innovations and new techniques, including a roughened surface applied to the concrete on the truck lanes by spreading handfulls of small chips (3/8 in. minus) on the fresh surface just ahead of the burlap drag. The chips were broadcast by hand by a State inspector riding the float. The drag pulled the chips over surface with a scoring effect.

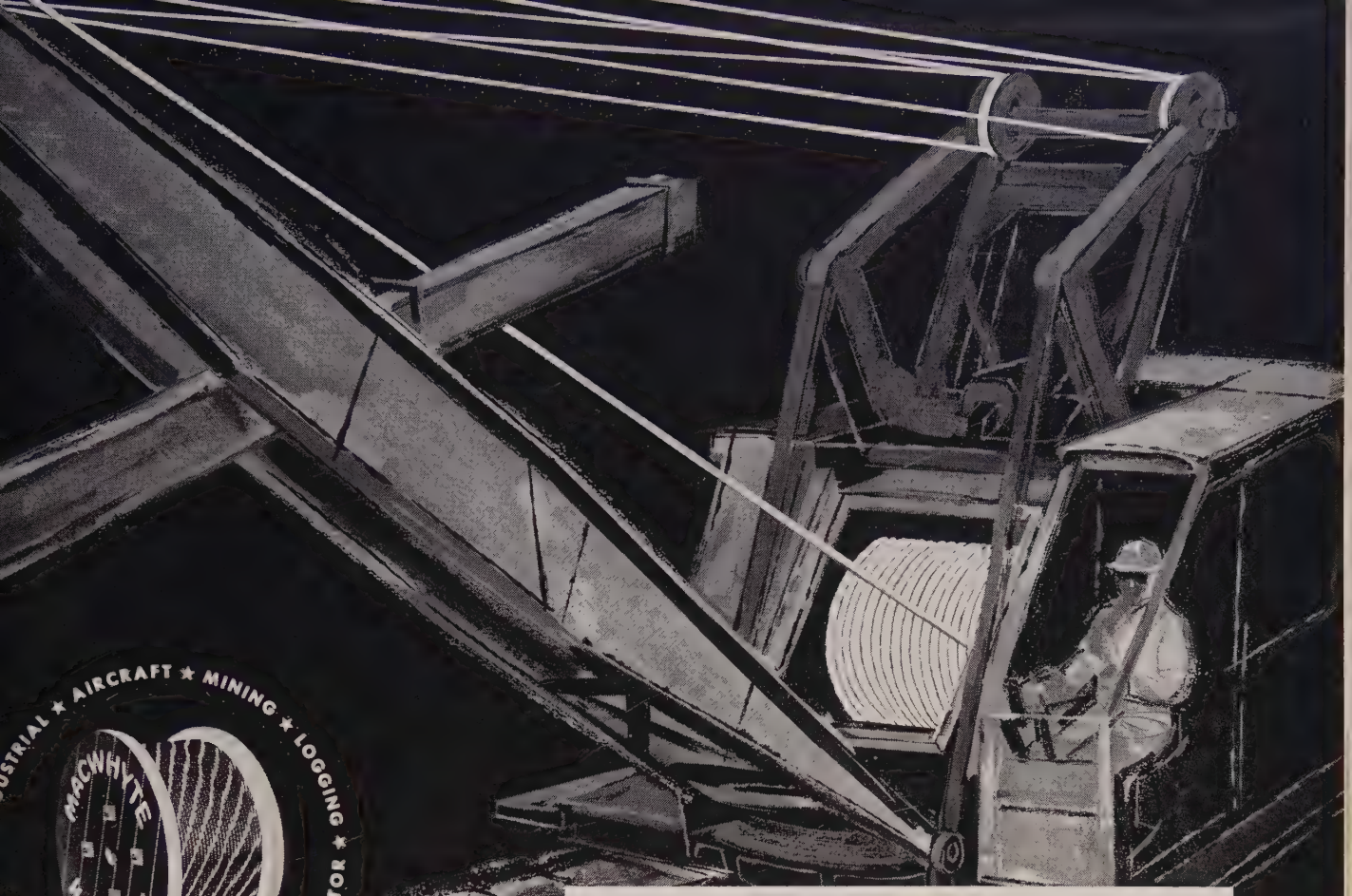
GUIDE WHEELS on windrow sizer protect header alignment on curves of project.

In preparing the 4-in. cement-treated base on which the concrete was placed the contractor used a heavy windrow sizer riding the headers and pulled by a crawler tractor. On curves, with their high supers, the machine tended to twist sideways and push the headers out of alignment. To combat this, the contractor welded horizontal guide wheels at each corner to maintain constant contact with the headers and guide the big form around the curves.

Headers themselves were placed with the aid of a Cleveland Formgrader considerably modernized by the contractor. Hydraulic cylinders were installed on the iron-wheeled tractor-like implement for steering and to raise and lower its cutting wheel. To this was added an automatic electronic switch system with a wire fork mounted on one side of the machine to follow a grade wire, maintaining a constant cutting edge depth in relation to the wire. The grader cut a path about 2 ft. wide, making a pass for each header line.

Personnel

Contractor Guy F. Atkinson Co. staff includes Ted Jones, project superintendent; Dan Lowrey, project engineer; Kenneth Westfall, office manager; "Red" Bentley, master mechanic; John Michelson, paving superintendent; and "Chuck" Thomey, general foreman.



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213-A

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Surveying a 23-mi. water tunnel

A review of the procedures and day-to-day work during driving of the Harold D. Roberts Tunnel, built by the Denver Board of Water Commissioners from the west slope of the Continental Divide to the South Platte River. Details of establishing and producing a tunnel line from a 916′ shaft. Summary of survey results at holing-through.

By H. K. DICKINSON
Construction Engineer
Tipton & Kalmach, Inc.
Consulting Engineers, Denver

SUCCESSFUL TUNNELING, particularly on long bores through the mountains of these Western states, represents a combination of accurate surveying by the engineer and responsive driving procedures on the part of the contractor.

The precise control surveying which must precede the actual start on all tunnel projects represents a highly scientific application of survey methods and procedures. Although an important preliminary to construction work, it is not directly related to day-to-day underground activities, and is not a logical subject for review in a construction magazine. Such precise surveying was carried out over a period of several years, prior to the start of driving Harold D. Roberts Tunnel. The results of this work were to establish the position and elevation of both tunnel portals, together with adequate back-sights for projecting the alignment underground. Also, this work established the location of an access shaft located 8½ mi. from the west portal. Incidentally, the first leg to the west of this shaft was holed through about 5.1 mi. from the portal. The second holing through occurred about 10 mi. from the east portal, making it 4.8 mi. from the shaft.

With tunneling crews moving underground, it became the daily responsibility of the engineering forces to provide line and grade at the faces for every round. In addition, and possibly more important, there was the precise surveying which followed behind this routine work to run the precise lines into the tunnel.

These are the operations that involved coordination between the survey crews of the engineering force and the contractor's crews at the face.

At the request of *Western Construction,* the following description of this daily survey-and-driving work has been reviewed in some detail to indicate its type, extent, and procedures. Actual driving operation in the tunnel has already been described in *Western Construction,* September 1959.

The other survey problem of more than usual interest was the extending of the tunnel alignment down the access shaft and into opposite headings. Because this represents a survey problem of considerable importance in many tunnel locations, it will be described in some details as the second section of this article.

CONSTRUCTION SURVEYS

All survey work for establishing line and grade in the tunnel headings and for determining excavation quantities was performed by the tunnel inspector and transitman employed in each heading.

The control points for the heading surveys were carried on concrete monuments located in the tunnel invert approximately 500 ft. apart. The monuments consisted of a brass bar and pin embedded in a concrete block about 1 ft. square. The tunnel line was punched on the bar and the brass pins were used as bench marks for the construction levels.

Red backsight lights (flash light bulbs) were set on line in the tunnel arch a short distance from each monument and at least three of the

TURNING ANGLES at night on a high mountain peak with a T-3 Wilde Theodolite. Many nights, even in midsummer, the party would have to wait for hours for the icy wind to subside before readings could be made. Curious mountain sheep provided entertainment.

MICRO ROD illuminated for establishing points on the tunnel tangent line over the Continental Divide.

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LOWERING a plumb bob into the water barrel at the bottom of the 916-ft. shaft. During a period of two years this line dropping and sighting-in operation was repeated 18 times. Two were made with brass wire to check the possible effect of magnetism from steel in the shaft.

backsight lights were sighted when the tunnel line was produced ahead. As the tunneling progressed, centerline roof spads were set in wooden plugs driven into the roof of the tunnel at 75-ft. intervals. The levels were also carried on the bottom of the roof spads.

The survey procedures and the duties of the inspector and transitman can best be explained by describing the heading activities during a normal shift.

Upon arrival of the "man train" from the portal at the beginning of an 8-hr. shift, the fresh crew immediately took over the heading operations and continued with the work that was in progress at the end of the last shift.

After reviewing the reports covering the previous shift, the inspector observed the heading conditions with the contractor's shift boss and discussed any changes in tunneling operations that either of them considered necessary. The spacing of tunnel supports, the depths of rounds and unsafe working conditions were usually the main topics of conversation. The inspector also decided what survey work was to be done during his shift and gave necessary instructions to the transitman.

Survey work, such as setting roof spads, running check levels, checking alignment and advancing the tunnel stationing was always done while the heading crew was drilling for blasting the next round. To set a new line spad the transitman usually set the transit under a spad which had been previously set within 150 ft. of the tunnel face.

Then, after checking his set-up by sighting through at least 3 backsight lights, the telescope was plunged and line was given to a driller on the top deck of the jumbo (approximately 20 ft. back from the face) for drilling a hole for a wooden plug. After the hole was drilled and the plug driven tightly into the rock, the point for the spad was established by double centering at least two times. The tunnel stationing and the elevation for the new spad was then brought forward from the last spad.

The time required for drilling an 8-ft. round varied from 40 to 60 min., loading and blasting operation usually took 30 min. and average mucking time was 1 hr. Under normal tunneling conditions each shift completed at least two rounds. The tunneling work was performed on a 3-shift, 6-day week basis and the daily advance averaged 50 ft. except when bad ground conditions or seepage water were encountered.

Line and grade for advancing the tunnel face and for setting the steel tunnel supports were given by the inspector and transitman immediately after the heading was mucked out. The transit was set under the last spad and the height of instrument was determined by measuring down from the roof spad. After backsighting on the backsight lamps the transit telescope was plunged and center line points were given for painting a vertical line on the tunnel face. The instrument elevation was then transferred to the tunnel face by leveling the telescope and the grade of the tunnel was established by measuring a calculated distance from the level mark. A paint line was then scribed on the rock face from the center point with a brush attached to a powder tamping stick cut to a length equal to the radius of the tunnel.

While the tunnel face was being marked for drilling the next round, the steel tunnel supports were brought into the heading and all the loose muck on both sides of the tunnel was removed in preparation for setting the supports. The inspector and transitman set the support foot blocks to line and grade from the same transit set-up that was made for establishing line and grade in the heading. To avoid having to compute grades in the tunnel, a grade sheet was prepared by the office engineer furnishing the spring-line grade for every 10-ft. station.

As soon as the foot blocks were set, the tunnel cross-sections were taken and all "tight rock" was marked for removal. The sections were taken at 10-ft. intervals with a "sunflower", common to much tunneling work. Its center was set to line and grade at each 10-ft. station from the same transit set-up and the distances from the center of the sunflower to the perimeter of the tunnel were measured at every 10 deg. of arc to the nearest 0.1 ft. The cross-sections were plotted in the tunnel by the inspector and duplicate copies were furnished to the contractor every day.

As soon as the cross-sections were taken, the drill jumbo was returned to the heading for drilling the next round but the drilling was not commenced until the steel tunnel supports were set on the foot blocks and properly blocked in place. After the drill jumbo was moved ahead, the instrumentman reset the transit under a roof spad and aligned the cap of the supports for the heading crew.

The tunnel supports were required in about 77% of the entire tunnel. The spacing of the supports varied from 18 in. to 5 ft. depending on the rock conditions. In the most severely fractured zones or where mud and gouge material was encountered, steel struts were also installed in the tunnel invert to strengthen the circular shaped steel ribs. Those areas not requiring steel supports but considered hazardous because of the rock spalling and sloughing were either coated with 1 in. of gunite or rock bolted.

In addition to the survey work just described, the heading inspectors and transitmen working on the day shifts were responsible for the

permanent concrete monuments being set and establishing the initial line, elevation and stationing at each monument. They also set the backsight lights and checked roof spads set on other shifts.

The same survey procedures were employed in all four headings under the supervision of the resident engineers and chief inspectors.

At least once a month, the tunnel alignment, levels and chaining were checked in each heading by the precise survey party. Errors of any consequence were reported by the chief of the precise survey party to the resident engineers and the necessary corrections were made as the tunnel driving was advanced.

LINE being established on a roof scale near the bottom of the shaft. Transits took their line from the "sway scales" of the plumb-bob wires and projected it to this scale about 375 ft. into each heading from the center of the shaft. A series of 20 readings on each roof scale constituted a "run."

ALIGNMENT DOWN THE SHAFT

The access shaft located about 8.5 mi. from the west portal is 916 ft. deep and 16 ft. in diameter. The center of this shaft is 11½ in. off the tunnel line. Two skips were installed in the shaft, one for handling muck, and the other for transporting men, materials, and equipment. In addition to the usual structural steel required for skip guides and ladders, the shaft included a 4,160-volt electric conduit and two 20-in. ventilation pipes. These elements not only limited the amount of space for the necessary survey operations, but also the amount of steel caused some concern about the possibility of effect during plumbing. However, checks made during the plumbing operations indicated that the wires were not affected either by the electric current or by magnetic attraction.

The procedures and the sequence for establishing the tunnel line at the bottom of the shaft were as follows:

(1) Skips were raised out of the shaft and the tunnel ventilating blowers were turned off.

(2) Plumb line reels were set at the top of the shaft and piano wires were lowered with 6-lb. bobs. These wires were moved to within 1 in. of correct line, about 6 in. out from the concrete lining of the shaft.

(3) Two 55-gal. drums filled with water were set at the bottom of the shaft. The 6-lb. plumb bobs on the end of the wires were removed and replaced with 114-lb. wing weight bobs. Sway scales and hood protectors were set on top of the drums and electric lights for illuminating these scales were turned on.

(4) The manskip was lowered down the shaft and the plumb wires were carefully examined for clearance. The distance between the wires was accurately measured at both the top and bottom of the shaft.

(5) Both wires were accurately aligned at the top of the shaft. For this purpose the reels were equipped with micrometer adjustment. The piano wire that was used had a diameter of .025 in.

(6) After the wires had been steadied, so that the sway was about ½ in., the bottom transits were "wiggled" in on the approximate line of the two wires. Each of these transits was set up on concrete pads approximately 18 ft. back from the center of the shaft.

(7) With the bottom transits on approximate line, the wires were again checked by the top instrumentman. The transitmen at the bottom of the shaft then began reading the sway of the plumb lines on the sway scales. These scales were graduated on both sides with 40 divisions to the inch. Both bottom transitmen read the sway elongation on each scale five times with the telescope in direct position and the same with the telescope inverted. Each instrument was then aligned on the average sway scale readings for the two plumb bob wires as observed by that instrument. Alignment was easily accomplished by a lateral adjustment device made for this particular purpose.

After the instruments were properly aligned, each transitman double centered, first to the roof scale

HOLING-THROUGH station (Sta. 712) in the east leg of the tunnel. Note the flat angle in the tunnel track at this holing-through point.

back of him, then to the roof scale on the opposite side of the shaft, using the sway scale farthest away from the transit as a back-sight. A set of five readings were taken on each roof scale, with the telescope direct and with the telescope inverted. The average of all 20 readings taken on each roof scale constituted a "run".

(8) Plumb wires were then moved off line by the top instrument man, and then with the transit telescope inverted, the wires were reset to precise line.

(9) The entire operation as described in steps 5, 6, and 7 was then repeated.

During two years' time the line dropping operation as described above was repeated 18 times making a total of 36 "runs". Four of these runs were made with 50-lb. plumb bobs and steel wire, two were made with 32-lb. bobs and brass wire, and the remaining runs were all made with 114-lb. plumb bobs and steel wire. The different plumb bob weights and the brass wires were used as an attempt to determine if the plumb wires were being attracted or deflected by lateral forces.

The only indication that the wires were being affected by any lateral forces was that, with the heavier plumb bobs and steel wires, the individual sway readings were much less erratic and the averages were considerably more consistent. A second test was made for lateral deflection by dropping a third plumb wire in the center of the shaft and measuring the sway of the three wires consecutively. From this test, it was concluded that the wires were not being affected by any lateral forces because they were found to be on a perfect straight line.

In determining the final roof scale settings, eight of the 36 runs were eliminated because they were erratic and inconsistent with all other roof scale readings. The final scale settings were determined from a straight average of all the acceptable readings.

The plumb wires also provided means for establishing precise stationing in the tunnel at the bottom of the access shaft. This was done by measuring the distance from a surface monument, located near the shaft collar, to one of the plumb wires and then measuring the distance from the same plumb wire at the bottom of the shaft to a line monument in the tunnel. The stationing at the surface monument had been previously determined by triangulation. The survey work for establishing the tunnel stationing was repeated several times by different personnel so as to eliminate every possible chance of error.

The vertical control for constructing the tunnel from the access shaft was established from a precise benchmark located near the shaft collar. A precise elevation was first established on top of a vertical steel channel in the shaft, and the distance down to tunnel grade was measured on the face of the steel channel with a 200-ft. calibrated tape. The last tape measurement was taken with a level set up at the bottom of the shaft, and the elevation was transferred to a permanent benchmark in the tunnel.

Summary of results

During the last month prior to holing through the 8½ mi. section between the west portal and the access shaft, the precise survey party

(Continued on page 112)

For Top Efficiency, Kiewit Uses Kolman Portable Plants in Minot

50'x42" Kolman Model 101 with SB-90 Vibrating Screen loads trucks with screened aggregate while scalping out oversize.

Series of Conveyor-Screen Plants Produces Variety of Aggregates

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The job called for 60,000 cu. yds. of concrete, 64,000 tons of asphalt mixes, 38,000 cu. yds of filter gravel and 300,000 cu. yds. of base and subbase materials.

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WESTERN CONSTRUCTION NEWS ®

San Luis dam approved by Congress

AUTHORIZATION of the San Luis Unit of the Central Valley Project in California is a step in Federal-State relations which will assist in solving California's future water supply problems, according to Secretary of the Interior Fred A. Seaton. The authorizing legislation was signed into law by President Eisenhower on June 3.

"The San Luis Unit was first recommended to Congress in 1957," Secretary Seaton said, "and the President reiterated his continuing interest in its passage in a message to Congress as recently as a few weeks ago."

The authorizing legislation provides for initial construction of either a 1,000,000 or 2,100,000-ac. ft. capacity reservoir on the western side of the San Joaquin Valley to which water would be delivered by using the off-season capacity of the Tracy pumping plant and Delta-Mendota Canal of the existing Central Valley Project. Canals would take the water to a service area of approximately 500,000 ac. in western Merced, Fresno, and Kings counties in a strip about 65 mi. long and 13 mi. wide, centered about 30 mi. southwest of Fresno. The project is estimated to cost $290,430,000, not including distribution and drainage systems.

The legislation provides a framework whereby the Federal Government and the State of California may collaborate in constructing and operating certain features of the plan which can serve jointly both the Federal project and the state's water development program. The joint-use features contemplated consist of the San Luis Reservoir, forebay and afterbay, the San Luis Canal, and pumping installations. By constructing these joint-use features to capacities that will serve both the Federal and state needs, significant savings to both can be realized. Each would contribute proportionately to the cost of constructing and operating the joint-use features. The state is voting next fall on a bond issue to finance its own program.

Commissioner of Reclamation Floyd E. Dominy said the Bureau would undertake to reach a prompt agreement with the State on joint construction and operation details which can be presented to the Department and the Congress for approval. The legislation provides a cutoff date of January 1, 1962, for reaching such an agreement. Otherwise, the Federal government is directed to go ahead with plans for the Federal portion of the project.

The Bureau of Reclamation and the state have been cooperatively studying the physical and economic aspects of joint San Luis-Feather River construction and operation the past five years. These studies have covered such questions as design of San Luis pumps, location of San Luis Canal, effect of land subsidence in San Luis area, feasibility of off-peak pumping, drainage needs of the area, possible methods of cost allocation, and probable cost of joint features.

Preliminaries under way at Iron Gate project

CONSTRUCTION work is under way on the Iron Gate hydroelectric project of California-Oregon Power Co., with the principal item an earthfill dam, 685 ft. long and 173 ft. high above stream bed.

This unit represents a part of a $70,000,000 power development program on the Klamath River carried out by the power company. Present work is located down stream from Copco No. 2.

River diversion will be handled by a 16-ft. tunnel about 950 ft. long under an abutment.

An 18,000-kw. generator in the plant at the dam will handle the release from the reservoir which will be principally used to re-regulate releases from upstream reservoirs.

Walter L. Huber dies; nationally known consultant

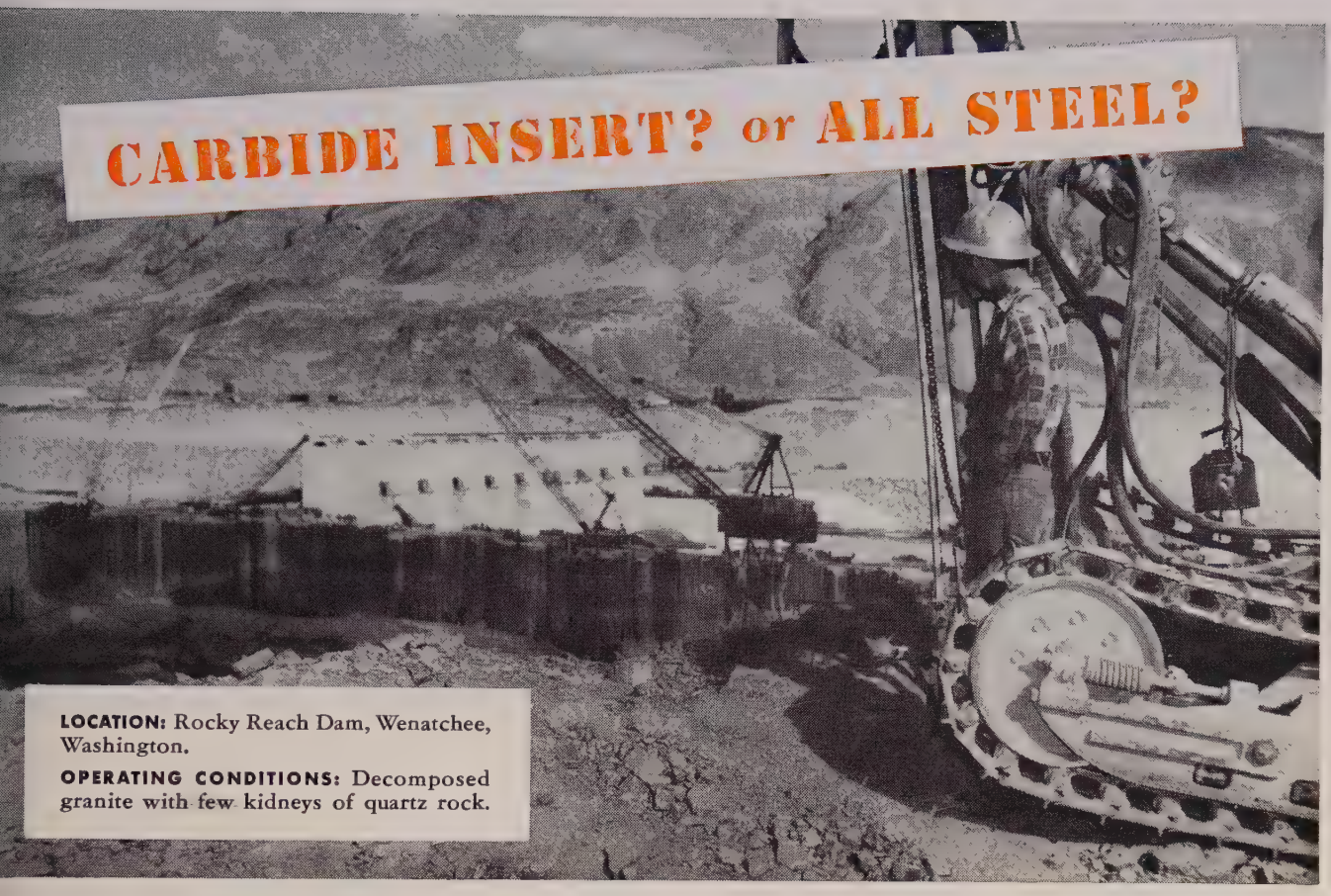
WALTER L. HUBER, past president of the American Society of Civil Engineers and nationally known consultant in structural and hydraulic engineering, died in San Francisco May 29 at the age of 77. A native of San Francisco, and proud of his California background, Huber graduated from University of California in 1905, and secured a rapid introduction into structural design during the rebuilding of San Francisco following the 1906 fire.

For several years, he served with the U. S. Forest Service in San Francisco when this agency was first concerned with all types of projects located in the national forest areas.

Walter Leroy Huber

Leaving the Forest Service, he established his own consulting office in San Francisco, an office which he maintained to the time of his death. Associated with Huber for many years has been Edward M. Knapik, and for about 20 years the firm has been known as Huber & Knapik, consulting civil engineers. The firm will be continued under the same name.

(Continued on page 84)



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That's the kind of performance you get with Timken carbide insert bits when conditions call for them. Their five front holes and deeper wing clearance help clear chips faster. You drill rock instead of chips.

But carbide insert bits may not always be your best bet. In ordinary ground, you'll save more with Timken all-steel bits. With correct and controlled reconditioning, they give you lowest bit cost per foot of hole when you can drill out full increments of steel.

But whatever your drilling conditions and whatever type of bit you use, your drillers will save time and you'll save money with Timken bits. They're all interchangeable in the same thread series. Your drillers can change bits as fast as the ground changes—without changing drill steels.

All Timken bits are made of Timken electric furnace fine alloy steel. We're the only American maker of removable rock bits who takes that extra step. And you get extra protection from a special shoulder union that protects threads from drilling impacts.

Get the right and most economical bit for your drilling jobs. Call or write: The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable: "TIMROSCO".

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Timken threaded carbide insert rock bit

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removable rock bits

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HUBER

(Continued from page 78)

Walter Huber was always deeply interested in professional affairs and active in the ASCE organization. He had served as director, vice president, as well as president of the San Francisco Section, climaxing this service to the Society with his election as national president in 1953.

He served on a large number and variety of consulting boards, local, state, and national. As a consultant, this service included work on the development of the Colorado River, and the broad program for water development in the State of California.

Structures coming from his design office are too numerous to mention, beginning with those for the Panama-Pacific Exhibition in 1915 and including the Union Square Garage, many buildings for the University of California, and other public and private buildings.

Peace River project may be started this year

THE much discussed and long planned storage and hydroelectric development on the Peace River in British Columbia could get under way with preliminaries late this year. According to officials of the Peace River Development Co., Ltd., if the necessary permits can be obtained before winter the driving of a pilot tunnel would be started at once.

In its present form, the project would include the building of two dams, one of which would provide 88,000,000 ac. ft. of storage, stated to be more than all of the existing storage in Washington, Oregon, and British Columbia combined.

Present developers of the Peace River project state that the work would tend to firm up power development and to insure industrial growth throughout the Pacific Northwest on both sides of the international boundary.

Oregon highway striping changed to national style

DURING the 1960 painting season, the Oregon State Highway Department will change its familiar yellow center line to a dashed white center line to make it conform to the national standard set by the U. S. Bureau of Public Roads. In addition, the lane lines will be also dashed in white and the edge stripes will be solid white. All other markings will remain yellow, according to W. C. Williams, State Highway Engineer.

Oregon will continue to use yellow for the double center lines, curb markings, no-passing zone barrier stripes, stop lines, cross lines, and other symbols. It is expected that the cities and counties in Oregon will begin to adopt the new standards during the present season or in 1961.

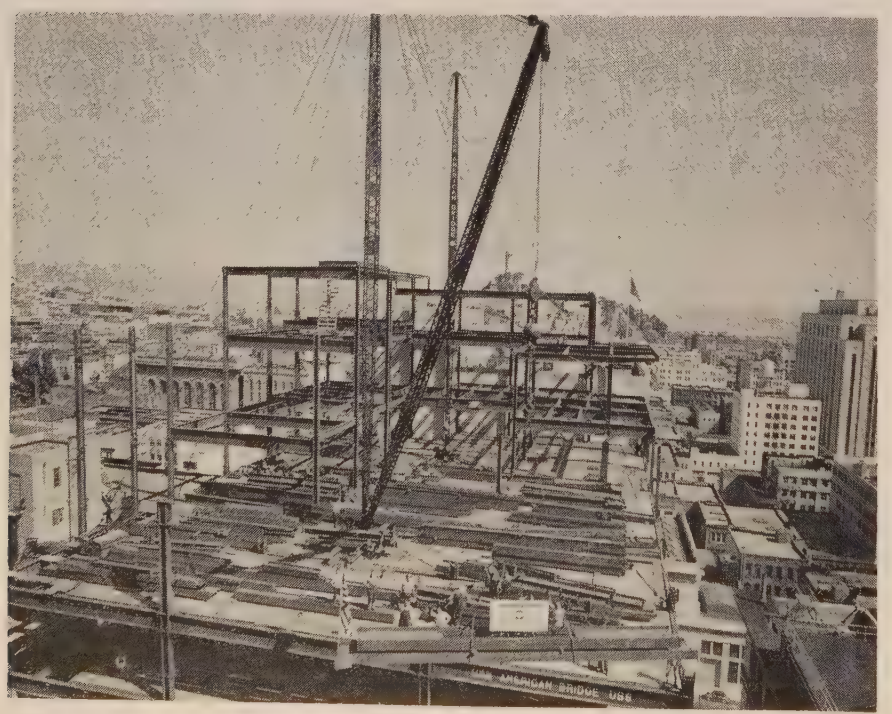
Concrete placing starts at Glen Canyon Dam

PLACEMENT of concrete at Glen Canyon Dam was started June 17, with the dumping of the first 12-yd. bucket. A ceremony triggered a new phase of construction of the record structure which will result 4 years hence in a 700-ft. barrier creating a 186-mi. lake in the deep Glen Canyon of the Colorado. Some concrete has already been placed for test purposes but the June 17 ceremony inaugurated full scale concreting operations.

The project is already considered to be 24% complete from a standpoint of funds expended, although there is little evidence as yet of a structure ultimately to be completed in the excavation in the depths of the canyon. Of a total estimated cost of $183,237,000 for the physical structure of the dam excluding the powerplant approximately $63,500,000 will have been spent by the end of this fiscal year June 30. Total cost of the dam, with powerplant, switchyard and appurtenant features including the protection of the Rainbow Bridge National Monument in a side canyon about 60 mi. upstream, is estimated at $324,074,000.

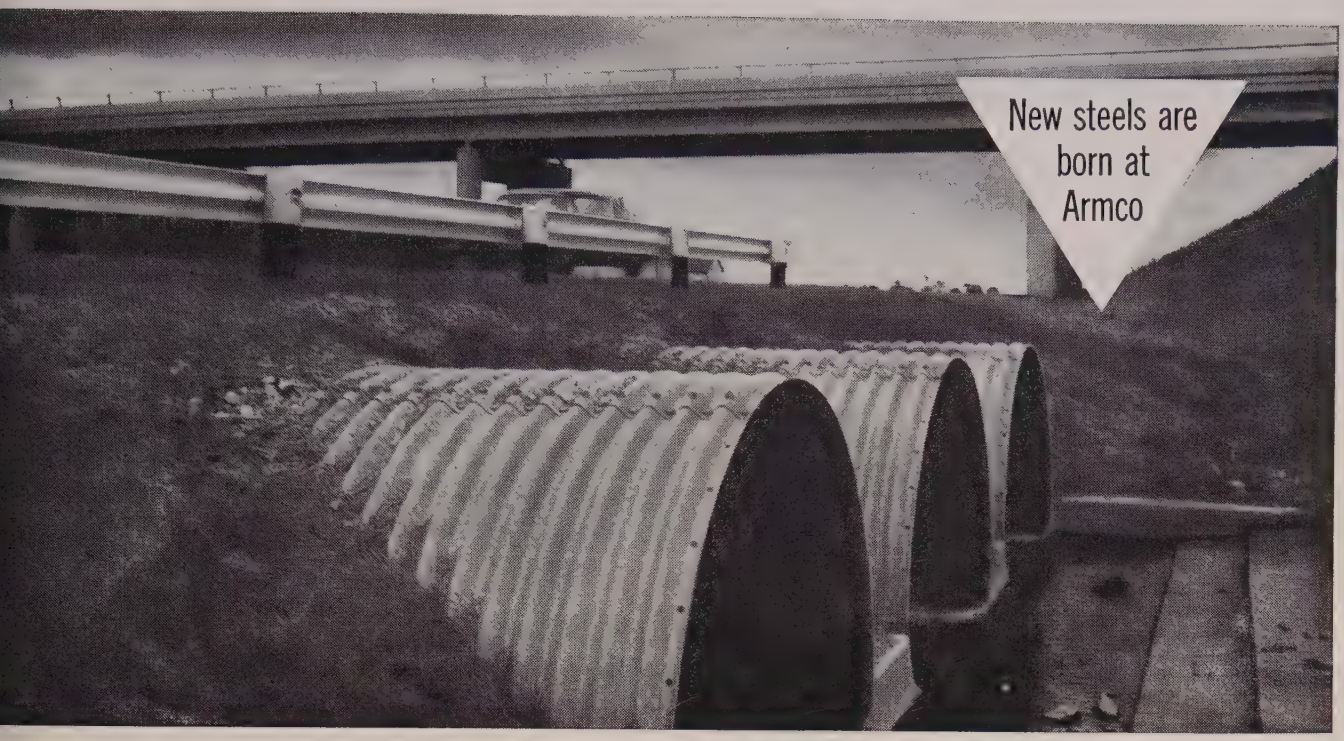
"Rimrock Lake" is official

THE NAME "Rimrock Lake" has been approved by the Board on Geographic Names for the reservoir created by Tieton Dam on Tieton River, a tributary of the Yakima River, in Washington. The 8-mi. reservoir in Snoqualmie National Forest, about 30 mi. west of Yakima, has long been known as Rimrock Lake locally and the name is well accepted throughout the Yakima Valley. Rimrock Lake is part of the Tieton Division of the Bureau of Reclamation's Yakima Project.



TRADITIONAL flag-raising ritual held as the final steel moved into place for the new headquarters of Wells Fargo Bank American Trust Company on California Street, San Francisco. A temporary flagpole attached to the steel carries a 50-star American flag to the top of the structural framework. The first structural steel was erected on the job by a U. S. Steel crew two months ago.

More than 2,500 tons of steel were required for the structure, the second 12-story unit of the bank's new headquarters. Cahill Construction Co. Inc., San Francisco, is the general contractor.



Three lines of Armco MULTI-PLATE® Pipe-Arch provide waterway for creek crossing new relocated freeway in Ohio.

Highway design is 50 years apart, yet . . .

Armco Drainage Pipe serves both relocated freeway and old highway

A relocated modern four-lane freeway now replaces the original 1907 highway. On both, Armco Corrugated Metal Drainage Structures were installed. The old road still carries local traffic, and the 50-year-old Armco Pipes are in good condition. On the new freeway, Armco Pipe again met all requirements.

This story is being repeated all over the country. *Proved durability* is influencing selection of Armco Drainage Structures for the country's newest highways, freeways and expressways.

Contractors find that Armco Structures meet specifications and are economical in initial cost. Also, they're easy to install with small crews and lightweight equipment. Speed of installation helps complete projects on schedule.

There is a size and shape of Armco Structures to meet practically every drainage requirement. For example, pipe is available in diameters ranging from 6 to 180 inches.

For dimensional, gage, loading and installation data on Armco Corrugated Metal Drainage Structures, write for our new catalog. Armco Drainage & Metal Products, Inc., 2180 Milvia St., Berkeley 4, California, or P.O. Box 751, Federal Station, Portland 7, Oregon.

Taken in 1923, this photo shows twin Armco Pipes installed in original highway in 1907.

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HAWAII Report

By ALAN GOODFADER, Honolulu

IN THE WAKE OF THE TIDAL WAVE – Community planners are urging that portions of Hilo town be transplanted away from the area hit by the wave. Rescue workers were still estimating damage and counting the dead at this writing. Damage was expected to run to at least $25 million in Hilo alone and the death toll there was above 40. Walter K. Collins of the planning organization of Belt Collins and Associates, Ltd. said he's going to recommend that homes, industry and commerce be shifted further inland. He had been hired by Hawaii County to master plan Hilo's growth. He said "The sound thing to do" would be to convert the tidal wave area into State parks and ask the State to give up land near Hilo for the shift. The State estimated that more than 100 employers were wiped out by the wave, throwing 1,500 out of work in Hilo.

BOOM CONTINUES – Meanwhile, Honolulu's building boom rolls along. The City Department of Building announced that permits for civilian construction estimated at more than $61,500,000 had been issued in the months through April. Last year, the total for the first four months was $33,000,000. City building inspectors expect a new record volume to be set this year. Last year's $129,000,000 is the record to date. A total of 4,530 permits had been issued so far this year compared to 3,319 in the same period in 1959.

EMPLOYMENT HIGH – The State Department of Labor said employment reached a monthly high of 172,280 in the State during April, largely from hiring by contractors. A Bank of Hawaii round up of development plans for the Neighbor Islands seems to indicate more hiring in sight. Plans for two new hotels on Kauai, a 380-lot housing development on the Island of Hawaii and several hotels on Maui are included in the roundup.

MISSILES SOAR – Col. John R. Clifton, district engineer here for the U. S. Army Engineers, recently told the General Contractors Assn. of Hawaii that his office plans to place $70,000,000 to $75,000,000 in construction during the next year to 15 months. Most of this will be military construction, with $14,000,000 of it to be Nike-Zeus work on various Pacific Islands. At present, the district has almost $37,000,000 of construction under contract by about 15 contractors in the State and on Kwajalein and Johnston Islands, mostly in the Nike-Zeus missile test program on Johnston and Kwajalein. Also upcoming is construction of more Nike-Hercules facilities on Honolulu's Island of Oahu. On civil works, he said a comprehensive study is under way of possible small craft harbor works and several new deep draft harbors.

HARBOR WORK STARTS—The State Board of Harbor Commissioners have authorized $230,000 in Neighbor Island port improvements, mostly in Hilo. The status of the work is uncertain in the wake of the tidal wave.

CULTURE MEANS CONSTRUCTION—The University of Hawaii has approved a preliminary plan for location of the East-West Cultural Center recently authorized by Congress. This means construction could start in the next few months. The university still must get an appropriation from Congress. The first group of buildings, budgeted for completion by the fall of 1962, is expected to cost $5,417,500. It would include dormitory and teaching facilities. The idea of the center is to provide a training place for community leaders and future leaders of Asian countries as well as U. S. workers in those countries. The whole five-year building program as envisioned by the univeristy would cost $71,074,800.

ROOFERS GET RAISES—About 200 workers for 11 Honolulu roofing contractors will get 40 cents in wage raises and 10 cents in benefits over the two years covered by a contract signed recently. As of April 15, journeymen's wages were set at $2.70 an hour, foremen's at $2.82½ and helper's at $2.35. Ten cent increases go into effect Aug. 15, Feb. 15, 1961, and Aug. 15, 1961. The 10 cents in benefits will increase a medical plan.

SLUM CLEARANCE SET – The Honolulu City Council has approved a Honolulu Redevelopment Agency's plans for a $24,000,000 slum clearance project in downtown Honolulu. The plans now await expected Federal approval. The plan would clear a 75-acre parcel in heart of Honolulu and re-develop it as a model housing and commercial area.

PRIVATE WORK—Plans are reported firm for two large private commercial construction projects and an industrial park in Honolulu. Rothwell Construction Co. was low bidder with an offer of $919,000 to build a new automotive firm building for the Schuman Carriage Co. The prestressed concrete building will include rooftop parking. Falzone Construction Co. of Hawaii, Ltd., will build a million-dollar 12-story York International Medical-Professional Building downtown. A $2,000,000 five-acre industrial park in the Sand Island Access Road area of industrial Honolulu will get under way this summer, it has been announced. Pre-fabricated steel Soule buildings will house the companies locating there. About three-quarters of the space already is rented.

PIPELINE PROJECT—The Honolulu Board of Water Supply has given the green light for Honolulu's multi-million-dollar Ewa-Waianae water system. It okayed installation of an $800,000, 35,000-ft. 24-in. pipeline as part of the project. Also authorized by the Board were construction of a $500,000 pumping station and reservoir at Wahiawa in rural Oahu and a $950,000 reservoir and pipeline in Waimanalo. The board awarded a $196,938 contract to Pacific Utility Co. to build a 24-in. main in the rural Oahu town of Kailua.

NEW DEVELOPMENTS – Plans for a geodesic dome structure to be used as a school building are being drawn up by the City of Honolulu. It's an experiment to see if school construction costs can be cut by more intense use of school buildings. The idea is that the dome can be used – with collapsible inner walls – for a multitude of activities. Pacific-Hawaiian Culvert, a new firm with house tract developer Robert E. Black as president, has begun the first manufacture here of asphalt-dipped corrugated pipe for use in drainage projects and culverts. The bottom of the pipe has paved inverts of asphalt to lessen the abrasive action of water and debris on the pipe.

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ALASKA Newsletter

By CLIFFORD S. CERNICK, Fairbanks

CLEAR JOB — More than 1,000 men are now at work at the big Ballistic Missile Early Warning Site at Clear, now commonly known as BMEWS. Construction at Clear is heading into peak tempo, with round-the-clock daylight available to spur the work. Biggest contractor on the job is Baker & Ford, which now has some 500 men at work—including Baker & Ford subs. For construction men at Clear, pay envelopes are fat. Most of the men are working six 9-hour days. This gives them fourteen hours of overtime —and it's the small paycheck that doesn't go over the $200 mark. One check I saw was for $450 for the week's work, though this is not typical. The average would be closer to $250. On a project as vital as this to the nation's security, however, costs are secondary; getting the job done is primary. Meanwhile, the annual job rush to Alaska continues in full swing. One construction man arrived from as far away as Costa Rica hoping to go to work at Clear. Virtually all the hiring for Clear and other jobs is done through the unions. However, contractors are allowed to hire directly a small percentage of their total crew: youths who are in college and need the jobs to further their education. Unions were not encouraging "outside" workers to come to Alaska unless they had jobs sewed up, expense money and a round-trip ticket.

THE SUMMER SCENE — A collection of construction glimpses which could happen only in Alaska during the summer construction season: a workman on the new Weeks Field School in Fairbanks mopping his brow as he swelters in the 80 degree heat. . . A car full of job-hunters arriving in Fairbanks from the smaller states bearing this sign on the rear bumper: "We Get Construction Jobs Or We're Busted." . . . Saturday night in an Alaskan honky-tonk, thick with smoke: so crowded not another patron could push his way through. . . One construction worker is building a home during his off-work time; says he plans to sell it for twice what he put into it, this September. . . The surplus stores in Fairbanks report heavy business from construction men outfitting up to go out on the job. . . There's daily airplane service to the Clear construction site. . . At least three construction men entered boats in the big 700-mile Circle City to Fairbanks Yukon outboard marathon.

MATERIALS FROM JAPAN — We can predict that before long a sizable portion of all construction material being used on Alaska jobs will be stamped "Made in Japan." Japan is set to supply Alaska jobs with steel, concrete, and miscellaneous hardware. A schedule of sailings to Alaska ports, principally Anchorage, has been worked out. Despite tariffs, the Japanese believe they can still land construction materials in Alaska cheaper than the American-made items can be shipped via Seattle.

BIG PIPELINE — Construction of a natural gas pipeline from the Kenai Peninsula to Anchorage is scheduled to begin in July. Delta Engineering Corp. is acting as agent for the Anchorage Natural Gas Corp. in the project. About half of some 500,000 ft. of 12-in. pipe has already arrived in Anchorage aboard a Danish vessel. A German ship also is bringing in pipe for the job. Meanwhile, survey work is continuing on the pipeline route. Contract for the actual construction will be let from the Houston, Texas office of Delta Engineering. Dale Teel will be in charge of operations for the Anchorage gas corporation. One of the problems involved in bringing natural gas from the Kenai fields to Anchorage is the necessity for crossing Turnagain Arm. This is a rough stretch of water and calls for special engineering attention.

BIG PAVING JOB — The biggest paving project in the history of Anchorage is under way. Cheney Construction Co. recently began the initial phase of the 106-block, $1,100,000 improvement program.

FIVE HOMES A DAY—A pre-cut housing plant is expected to be in operation in Anchorage by the middle of July and will have a capacity of five homes a day. The two local firms set up to construct and market the homes estimate that on the basis of such a volume of construction, the cost of homes in Alaska can be cut by a third. About 10 basic single-family plans will be offered in two-to-four bedroom designs with from 850 to 1,500 square feet of living space. In addition, a duplex and a fourplex will be offered.

PERMAFROST TOUR — An outstanding group of authorities on the subject of permafrost, as related to construction, made a tour of Alaska recently. The four-man party's tour was arranged by the Alaska District of the U. S. Army Corps of Engineers. The party consisted of Prof. K. B. Woods, dean of the department of civil engineering at Purdue; T. B. Pringle of the military branch, office of the Chief of Engineers; K. A. Linell, chief of the Arctic Construction and Forest Effects Laboratory of the New England Division of the Corps and P. E. Clark of the soils and materials branch of the North Pacific Division of the Corps. Permafrost, one of the trickiest problems confronting construction men in the North, was studied by the group at a variety of locations in Alaska. Many aspects of the permafrost problem still remain unsolved—and are still a headache on the jobsite. In this column, several months back, I told how the Nome federal building had to be abandoned because of the action of permafrost. The Alaska Railroad has had a great deal of difficulty, also, with this problem; frost action, particularly in extremely cold weather, has a bad habit of heaving piling upward and forcing the rails out of alignment.

ENGINEERS PICKETED — The city of Anchorage is having difficulty with the Technical Engineers Local there. The surveyors for several days picketed the city engineering office when they were refused recognition of a bargaining agent from their union by the city council. City Attorney Richard Gantz defended the city's action by saying that the city has only so much money to pay out in salaries according to ability and seniority.

RIGHT-OF-WAY PROBLEMS — Acquisition of right-of-way for the state's 1960 road program is hampering that program considerably, according to the Bureau of Public Roads. Woodrow Johansen, divisional engineer for the Bureau, said roads in a number of areas were being held up because of right-of-way problems. Johansen,

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incidentally, will go to work with the state highway department when former federal jurisdiction over most of the highway work in the state is turned over to the state on July 1.

CIRCULAR SCHOOL — Alaska's first circular school structure, a 14-classroom building, is scheduled for construction within the next twelve months. The joint venture firm of Burgess Construction and Reed & Martin of Fairbanks were low bidders on the school with a bid of $1,216,000. In the new school, classrooms will radiate out from a central core and will be somewhat pie-shaped. Many Fairbanks residents consider the design highly unconventional—even controversial. There has even been a move by one faction to block construction of the school, but there's every indication that the work will go forward.

BEAR TROUBLE — The sort of thing that can happen on an Alaska construction job was related to newsmen by Douglas Olson, Bureau of Land Management fire fighter, from his hospital bed recently. Olson and a friend were taking a nap in the woods when a bear ambled up, reached down and took Olson's foot in his mouth. "I yanked my foot back and ran for the river. The bear looked startled." Olson was taken to the hospital with a gash in his foot, made by the bear's teeth when the foot was withdrawn from the bear's jaws.

CONSTRUCTION NEWS NUGGETS — Plans for a new hotel in the Fairbanks urban redevelopment area have been shelved, according to M. G. Gebhart, executive director of the Alaska State Housing Authority. . . Alaska's labor force is considered ample to meet all job demands, labor union leaders tell me. Some contractors, however, tell me they are beginning to feel the pinch in so far as good, skilled workers are concerned. . . The local Laborers' union said they still have more than 400 men on the waiting list for jobs. . . The U. S. government recently asked for bids on a new post office in the little town of Kenai, which has been growing rapidly since oil was struck in the vicinity. . . Many Alaska construction men are flying enthusiasts and at least three that I know commute between their jobs at Clear and Fairbanks.

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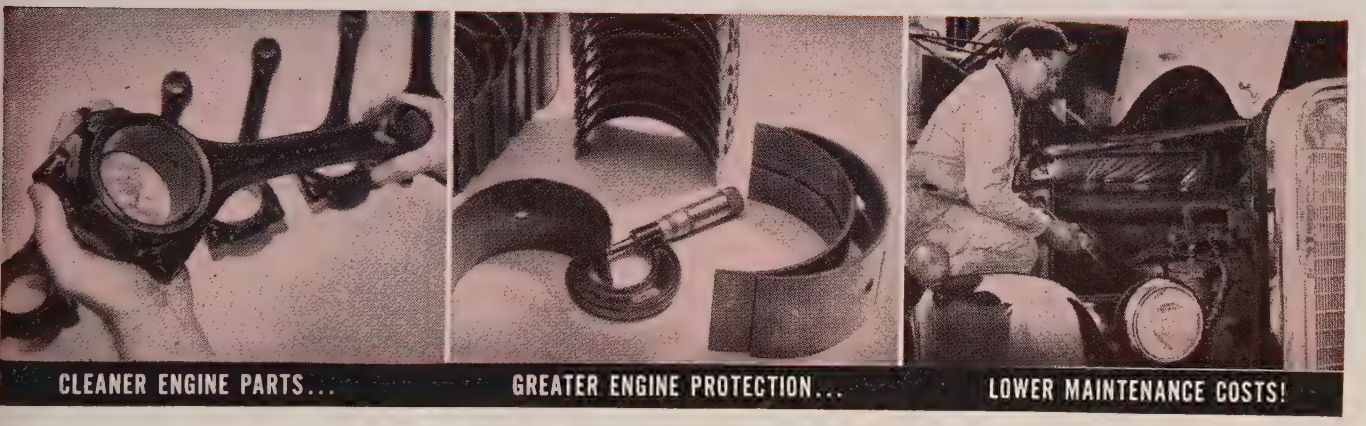

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Low bids and contract awards

ALASKA

A low bid of $5,827,000 was submitted by **Lease Co.** of Seattle, Wash. for construction of Mental Hospital in Anchorage. **B.E.C.K. Constructors** and **McLaughlin,** of Seattle, submitted a low bid of $1,726,444 for construction of Shemya Air Force Station communication facilities. **Premier Gear & Machine Works, Inc.,** Portland, Ore., in a joint venture with **H & K Constructors,** Spenard, submitted a low bid of $1,294,820 to build communciations facilities at Nikolski Air Force Station. Adak **P.O.L. Contractors** of Anchorage submitted a low bid of $1,987,000 for Schedules 1 and 2, communications facilities at Adak.

ARIZONA

Givens Construction Co., Phoenix, submitted a low bid of $517,928 for 2.6 mi. of grading, draining and surfacing on the **Fort Grant-Bonita** section of U. S. 666 in Graham County. **Wallace & Wallace** of Phoenix submitted two low bids for work in Tonto and Sitgreaves National Forests: $439,289 for 9.6 mi. of grading and surfacing, east of Payson to Kohl's Ranch in the Tonto National Forest in Gila County, and $349,590 for 7.8 mi. of grading and surfacing on Federal Highway 11 in Sitgreaves National Forest, Coconino County. **Fisher Contracting Co.,** Phoenix, submitted two low bids for roadwork in Coconino and Maricopa counties: $329,971 for 5.6 mi. of grading and surfacing on the Flagstaff-Clint's Well forest highway in the Coconino National Forest, Coconino County, and $127,509 for 10 mi. of grading, surfacing and related work on the Wickenburg-Phoenix highway in Maricopa County. **Isbell Construction Co.,** Phoenix, submitted a low bid of $230,573 for 5.7 mi. of grading and surfacing from interchange on U.S. 66, along Painted Desert Rim Drive in the Petrified National Forest in Apache County. **L. M. White Contracting Co.,** Tucson, submitted a low bid of $153,756 for 1.5 mi. of grading, surfacing, draining and concrete sidewalk in city of Casa Grande, Pinal County. **The Ashton Co., Inc.** of Tucson submitted a low bid of $206,442 for grading, surfacing, and structure on U.S. Route 89 in Maricopa County.

CALIFORNIA

Griffith Co. of Los Angeles received a $6,898,595 contract for constructing 1.2 mi. of 8-lane elevated freeway on the Santa Monica Freeway in city of Los Angeles, including ramps and frontage roads. Job will connect with a similar viaduct project between Hooper Ave. and Eighth St. for which an $8,737,889 contract was awarded March 23. **Griffith Co.** and **E. C. Young-Young & Arrieta,** Los Angeles, received a $2,672,562 contract for grading, paving and construction of 6 bridges on 2.9 mi. of 4-lane freeway on U. S. Highway 80 in city of El Cajon, San Diego County. **M. M. Sundt Construction Co., M. J. Bevanda Co., Inc.** and **Altermatt-Action Ventures, Inc.** of North Hollywood received a $4,489,113 contract for construction of roads and utilities at the U. S. Naval Missile Facility, Point Arguello, Lompoc. A low bid of $4,409,846 was submittted by **Gorden H. Ball & Gorden H. Ball, Inc.,** Danville, for construction of 7.7 mi., together with frontage roads, ramps and construction of 3 bridges and 3 pumping plants in city and county of Sacramento. **Ball & Simpson,** Berkeley, received a $2,122,412 contract for grading, surfacing and related work on 4.2 mi. to provide a 4-lane expressway on U. S. Highway 395 north of Mono Lake in Mono County. **Fred A. Arnold** of Los Angeles, received a $1,883,939 contract for construction of various buildings and related work at the Naval Missile Facility, Point Arguello, Lompoc. **Madonna Construction Co.** of San Luis Obispo received two contracts for highway work in San Luis Obispo County: $1,824,159 contract for grading, surfacing and 1 reinforced concrete bridge on 12.1 mi. south of Cambria, and $222,835 for reconstruction and widening on 3.6 mi. on County Road 673 north of Creston and construction of a bridge over Huer Huero Creek. **L. C. Smith Co.** of San Mateo received a $1,528,442 contract for grading and surfacing to widen U. S. 101 by-pass in South San Francisco, San Mateo County. **Montgomery Ross Fisher, Inc.** of Los Angeles, received a $1,329,000 contract for construction of communications school facilities at the Naval Training Center, San Diego. A $1,148,488 contract was received by **J. J. Ukropina, T. P. Polich, Steve Kral & John R. Ukropina** of San Gabriel for widening from 6 lanes to 8 lanes 6.5 mi. of the San Bernardino Freeway in Rosemead and Baldwin Park, Los Angeles County. **Peter Kiewit Sons' Co.,** San Francisco, received a $964,351 contract for completion of the Greenbrae Interchange on U. S. Highway 101 in Corte Madera and Larkspur, Marin County. Work includes grading, paving and construction of 2 bridges. **Isbell Construction Co.,** Reno, Nev., received a $822,803 contract for grading and surfacing to relocate 6.6 mi. of State Route 89 and construction of 1 bridge, north of Hobart Mills in Nevada County. A low bid of $383,991 was submitted by **A. Teichert & Son, Inc.,** Sacramento, for 5.3 mi. of grading, surfacing and bridge widening east of Sacramento in Butte County. A $376,900 contract was received by **Service Construction Co.,** Sun Valley, for grading, paving and related work at the Naval Air Station, Miramar. **J. T. McDonald Logging Co.** and **Ransome Co.** of Redding received two contracts for work in Siskiyou and Shasta counties: a $363,259 contract for 5.2 mi. of grading, surfacing and light signals in and near Yreka in Siskiyou County, and $243,920 for resurfacing a total of 39.2 mi. in various sections of highway in Shasta County. A $218,974 contract was received by **Fredrickson & Watson Construction Co.,** Oakland, for grading and surfacing on various sections of highway in San Luis Obispo and Santa Barbara counties. **L. B. Wells Construction Co.,** Visalia, submitted a low bid of $208,294 for 4.1 mi. of grading and paving at Strathmore in Tulare County. **Joe Lema Construction Co.** of Redding received a $204,843 contract for grading and drainage facilities on the Feather Lake Highway in Lassen County.

COLORADO

Thomas Bate & Sons, Inc. of Denver, submitted a low bid of $1,145,402 for construction of G/M Assembly Building and Technical Supply Facility at the Lowry Air Force Base, Denver. **Peter Kiewit Sons' Co.,** Denver, submitted a low bid of $1,298,264 for construction of access roads, Phase II, for Lowry Air Force Base, Denver. **Cherf Bros., Inc. & Sandkay Contractors, Inc.** of Ephrata, Wash. submitted a low bid of $445,806 for Schedule No. 1, earthwork and structures, Leon Creek and Park Creek diversion dams, and Leon-Park Feeder

he MASSEY-FERGUSON 406 speaks for itself:

"HAVE DONE—CAN DO!"

You don't have to depend upon guesswork to find out what a Massey-Ferguson 406 Can Do!

Simply ask the man who owns one . . . or ask your dealer to demonstrate for you.

You'll see that this powerful, speedy unit pushes tons of earth . . . fast and at low cost . . . when equipped with this matched angle dozer attachment. Or, it can load, stockpile, dig, do clean-up work, scarify — even sweep because of the many integrated attachments available for it.

The Massey-Ferguson 406 has Instant Reverse and torque converter. You change directions of travel instantly and smoothly by a touch of the toe. You never have to shift or clutch, and it travels as fast in reverse as it does going forward.

Direct thrust from hinge point to bucket tip, 9300 lbs. pryout capacity, 36° rollback at ground level, 50° at 3′ carry, telescoping reach to 126″ at hinge point, and 51° dump angle with bucket tip at 7′ give you the kind of performance features you want.

The 406 is classified as a 1 cu. yd. (SAE rated) tractor shovel, but it does bigger work than its rating indicates because it handles more loads day in and day out than single-purpose equipment costing much more. Yet, it is small enough, and has such excellent visibility, that you can use it for utility work at a handsome profit.

Compare it for performance, versatility, and cost against any machine in its power class. Ask your Massey-Ferguson dealer about it and other Massey-Ferguson Industrial Equipment, today!

Massey-Ferguson 1001 Tractor Shovel works circles around larger, more expensive equipment. Features Instant Reverse, torque converter, direct thrust, and telescopic reach. Has large selection of attachments.

The Massey-Ferguson 204 with power-matched loader and backhoe is an outstanding performer. The 204 is the only 40-h. p. industrial tractor with Instant Reverse and torque converter; permits fast maneuverability in close quarters.

The powerful Massey-Ferguson 220 Backhoe is available for the M-F 406, 204, and 202 Industrial Tractors. It performs second to none; is easily positioned for flush digging; has 14,000 lbs. breakout capacity, and permits unequalled visibility.

MASSEY-FERGUSON INDUSTRIAL DIVISION

Block 1000 South West St., Wichita 13, Kansas

Producing Sizeable Power for the "Sensational 60's"

MF60-34

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Glenn B. Dorning

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Perris
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Porterville
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Redwood City
Bayshore Tractor & Equipment

Sacramento
New Island Equipment Company, Inc.

San Diego
Smith Booth Usher Company

San Jose
Roose and Orlando

Santa Rosa
Guanella Tractor Company

Stockton
Central Tractor Company

Susanville
Eilts Machine Shop and Garage

Union City
William N. Box

Visalia
Mid Valley Equipment

IN HAWAII

Honolulu
U. S. I. International Division
U. S. Industries, Inc.

IN NEVADA

Las Vegas
Inland Service & Supply Corp.

Reno
Nevada Blacksmith & Equipment

Smith
Wines Brothers Equipment Company, Inc.

Yerington
Wines Brothers Equipment Co., Inc.

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Canal, Collbran Project. **Lewis-McNeish Construction Co.** and **Barben Bros. Construction Co.** (joint venture) of Bountiful, Utah, submitted a low bid of $461,163 for Schedule No. 2 on the Collbran Project. **Lawrence Construction Co.** of Littleton received a $629,216 contract for grading, surfacing and structures on U. S. 87 in Weld County. **Pioneer Construction Co.**, Pueblo, received a $278,046 contract for 7.4 mi. of grading, surfacing and structures between Fowler and Manzanola in Otero County. **Leone Construction Co., Inc.**, Trinidad, received a $164,291 contract for stabilization and asphaltic surfacing 7 mi. on State Highway 12 in Otero County. **Northwestern Engineering Co.**, Denver, received a $231,270 contract for grading, surfacing and related work on 6 mi. of highway east of Eads in Kiowa County. **C. L. Hubner Co.**, Denver, received a $407,746 contract for grading, surfacing and structure on 9 mi. in Jackson County, and asphaltic surfacing on 7 mi. of U. S. 40 in Grand County. **Colorado Constructors, Inc.**, Denver, received a $349,574 contract for grading, structures and surfacing on 3 mi. of U. S. 50 in Gunnison County.

IDAHO

LeGrande Johnson, Logan, Utah, received an $807,946 contract for grading, surfacing and overpass in Cassia County. **Earl L. McNutt Co.** of Eugene, Ore. received a $619,336 contract for grading, surfacing and concrete railroad overpass in Bingham County. **Hayes-Henry Construction Co.**, Idaho Falls, received a $311,035 contract for construction of Mobile Low Power Reactor No. 1, Test Facility, National Reactor Testing Station.

NEVADA

Dodge Construction, Inc., Fallon, received a $698,863 contract for constructing 6.5 mi. on U. S. Highway 395 near Washoe City in Washoe County. **Silver State Construction Co.,** Fallon, received a $3,694,174 contract for constructing a portion of highway on Route 80, west of Golconda in Humboldt County.

NEW MEXICO

Longenbaugh & Co., Inc. of Albuquerque submitted two low bids for roadwork in Valencia County: $1,731,288 for grading and surfacing on 4.3 mi. west of McCarty, and $1,012,544 for 1.4 mi. of grading, surfacing and related work west of McCarty. Two low bids were submitted by **J. W. Jones Construction Co.,** Albuquerque, for work in Bernalillo and De Baca counties: $1,635,631 for 1.2 mi. of grading and surfacing in city of Albuquerque, Bernalillo County, and $541,255 for 6.3 mi. of grading and surfacing on U. S. 60 and 84, Fort Sumner East and North in De Baca County. **Armstrong & Armstrong** of Roswell submitted a low bid of $474,428 for 2.7 mi. of grading and surfacing and related work on U. S. 54 and 70, Tularosa Urban in Otero County. A low bid of $423,014 was submitted by **Dan D., D. D. Skousen & Son, Skousen Construction Co.** of Albuquerque for 2.1 of grading and surfacing on U. S. 260, Central-Bayard, in Grant County. **Harry Trotz,** Contractor of Lovington, submitted a low bid of $196,175 for grading, sealing and surfacing various sections in Bernalillo, Valencia and Sandoval counties. **J. R. Cantrall Corp.,** El Monte, Calif. submitted a low bid of $371,705 for channelization of the Rio Grande.

NEW FRUEHAUF
Aggregate and Cement Hoppers

. . . haul up to a ton of extra payload!

Simplicity of operation, light weight, and reduced upkeep are the keynotes of Fruehauf's new, high-capacity aggregate and cement hoppers for the West.

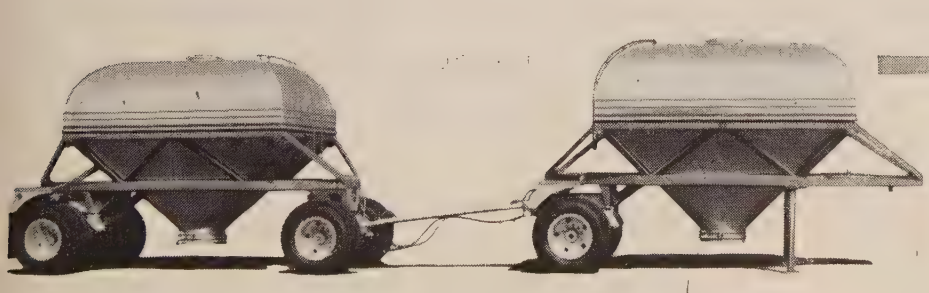
In combination operation the aggregate units have a payload capacity of up to 28 tons of sand, gravel, or mixtures when a 76,800 pound gross weight is allowed. These versatile units have been standardized for production so that the interliners can be replaced with cement hopper cans when desired.

Both semis and 4-wheelers designed for hauling aggregates have a capacity of 300 cubic feet with interliners of aluminum. 40″ x 50″ air operated clam shell gates are electrically controlled from the cab, or from the side of the trailers. The load carrying truss is constructed of rugged, high-tensile steel.

Among the users of the Fruehauf bulk-cement hopper Trailers is the Belyea Truck Company, Los Angeles, who use a fleet of these units to haul some 3,000,000 barrels of cement from Clarksdale, Arizona, to Glen Canyon Dam. In fulfilling a 4-year contract the units will travel 8,500,000 miles on a round-the-clock schedule.

"What governed my selection of Fruehauf hoppers," said J. L. Belyea, "was their ability to be changed from cement to aggregate use merely by the transfer of containers. We have enjoyed a fine relationship with Fruehauf for the past 30 years."

Both cement and aggregate hoppers, built in Fruehauf's Fresno, California, plant, feature this easy conversion from one use to the other.



FRUEHAUF TRAILERS

FRUEHAUF TRAILER COMPANY

Western Manufacturing Plants: LOS ANGELES, VINA VISTA, AND FRESNO

FACTORY BRANCHES: Los Angeles • Oakland • Fresno • W. Sacramento
Portland • Seattle • Spokane • Phoenix
Billings • Salt Lake City • Denver

For Forty-Six Years—
World's Largest Builder
Of Truck-Trailers!

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OREGON

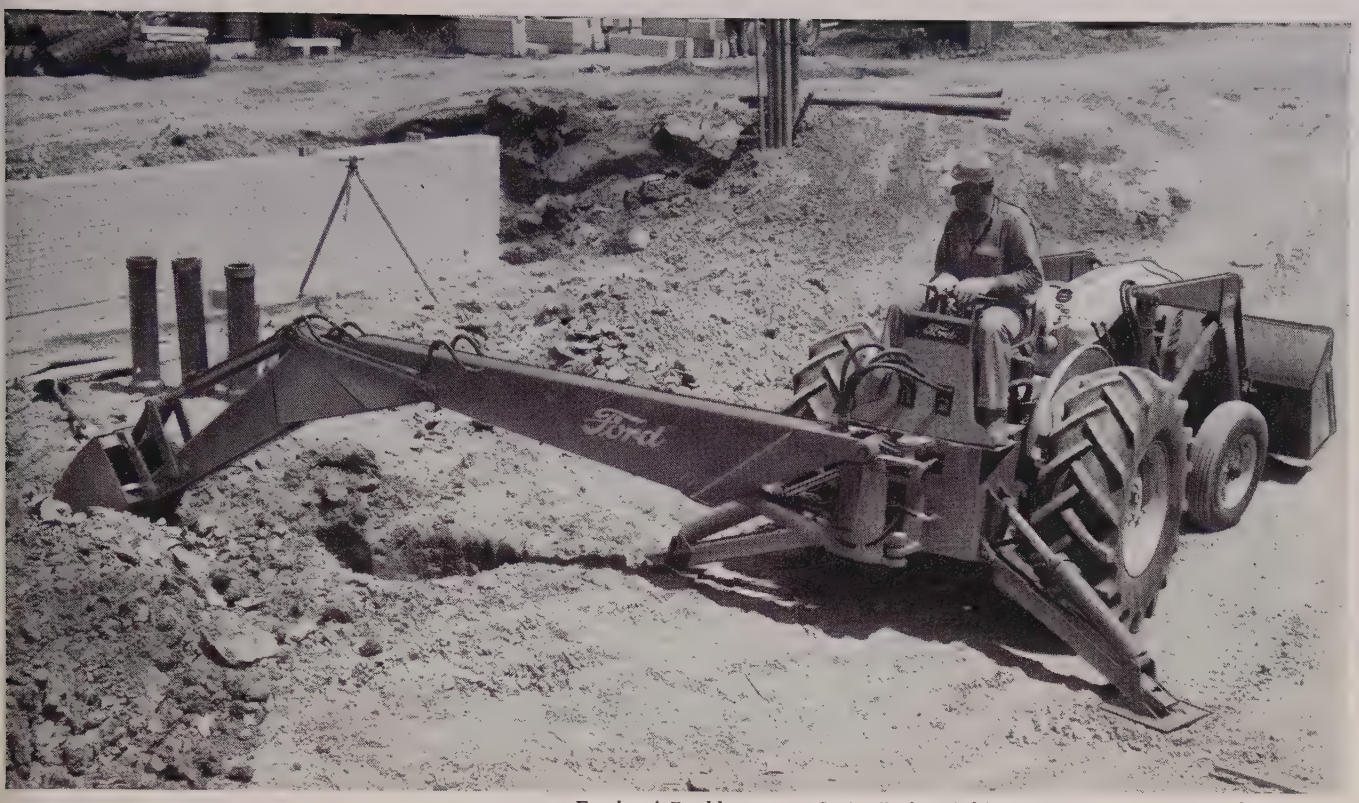
Green Construction Co. and **Tecon Corp.**, Seattle, received a $1,191,912 contract for final excavation and construction of the powerhouse at Hills Creek Dam on the Middle Fork Willamette River. **Peter Kiewit Sons' Co.**, Medford, received a $907,087 contract for grading, surfacing and structure on 3.1 mi. on the Cape Sebastian-Myers Creek section of the Oregon Coast Highway, south of Gold Beach in Curry County. **S & D Construction Co.**, Portland, received a $289,852 contract for twin structures, Alternate B, on the Deadmans Pass-Meacham section of the Old Oregon Trail Highway in Umatilla County, and submitted a low bid of $298,652 for Alternate A, Meacham railroad overcrossing in Umatilla County. **E. H. Itschner Co.**, Molalla, received a $188,684 contract for paving the Enterprise section of the Enterprise-Lewiston, Wallowa Lake and Joseph-Wallowa highways in vicinity of Enterprise, Wallowa County. **J. C. Compton Co.**, McMinnville, submitted a low bid of $104,386 for a paving project on the Farmington and Schools highways, south of Beaverton in Washington County. **C. R. O'Neil** of Creswell submitted a low bid of $117,486 for grading and paving the Airport-Ochoco Park section on the Ochoco Highway.

UTAH

M. Morrin & Son Co., Ogden, submitted two low bids for building construction in Brigham City and Logan: $2,100,735 for construction of Engineering & Physical Science Building, USU, Logan. **L. C. Stevenson & Grant Hansen Construction Co.**, Altamont, submitted two low bids for work in Carbon and Duchesne counties: $386,060 for 5.5 of grading, surfacing and 1 concrete frame structure near Duchesne in Carbon County, and $112,842 for 3.8 mi. of grading and surfacing from Duchesne southwesterly in Duchesne County. **Jack B. Parson Construction Co.**, Smithfield, submitted a low bid of $143,643 for construction of a plant-mix surfaced road, from South Perry to 2nd South in Brigham City, Box Elder County. A low bid of $249,716 was submitted by **Wheelwright Construction Co.**, Ogden, for grading and surfacing on 3 mi. of State Road 37 and 40 in Weber County. **General Contracting Corp.** of Salt Lake City submitted a low bid of $268,406 for grading, surfacing and storm sewer in city and county of Salt Lake. **V. C. Mendenhall Construction Co., Inc.**, Las Vegas, Nev., submitted a low bid of $172,141 for 3.2 mi. of grading and surfacing between Pintura and Ash Creek in Washington County. **Enoch Smith Sons Co.**, Salt Lake City, submitted a low bid of $423,635 for 1.5 of grading, surfacing and related work in Salt Lake County.

WASHINGTON

J. J. Welcome Construction Co. and **Acme Construction Co.**, Redmond, received a $507,979 contract for grading and surfacing on 1.5 mi., Thurston County Line to Kennedy in Thurston and Mason counties. A $403,841 contract was received by **Max J. Kuney Co.** of Spokane for 3.5 mi. of grading and surfacing, end of pavement to Davenport in Lincoln County. **Allen R. Anderson** of Seattle received a $359,770 contract for construction of bridges in Pierce County. **The Baugh Co.** and **N. Paduano Bulldozing Co.**, Seattle, received a $233,128 contract for 1.3 mi. of grading and surfacing and structure in King County. **N. Fiorito Co., Inc.** of Seat-



Ford 12′ Backhoe, 1801 Series Industrial Tractor, Super-Duty Loader

FORD REACHES 17 FEET...

10 foot wide stabilizers hold steady as a rock!

MORE REACH, MORE PRODUCTIVITY—Maximum reach from the swing post of a Ford 14′ Backhoe is over 17 feet—almost 2 feet more than the nearest competitor. With a Ford, you can dig a larger bellhole, or dig more feet of trench from one setting than with any other backhoe in its class. You can reach into the tight spots, handle problem jobs with ease . . . and you will move more dirt per cycle, too, because Ford's hydraulics and strength permit larger buckets —up to 7 cu. ft. struck capacity!

UNMATCHED STABILITY—Long reach and big buckets don't shake Ford—stabilizers are a full 10′ apart in working position. You can swing full right or full left (185 degree swing) and dig out a heaped payload without excessive rocking or tipping. And with Ford's long reach and wide stance stability you can load trucks far out over spoil or other obstacles!

10, 12, AND 14 FOOT SIZES—Each the most productive in its class! Pick the size you need—there's a model for any Ford or Fordson Power Major Tractor—and then choose from 5 types of stabilizer pads and 6 different buckets to suit your exact job requirements. Get all the details from your nearby Ford dealer today!

Super-Duty Loader—2500 lbs. lift, 5500 lbs. breakaway for more capacity, more productivity than any other loader in its class, plus . . . 22 degrees bucket rollback, 5″ below-grade digging, bucket position indicator, ⅝ to 1 cu. yd. buckets and a full line of attachments.

SEE YOUR NEARBY **FORD** TRACTOR AND EQUIPMENT DEALER

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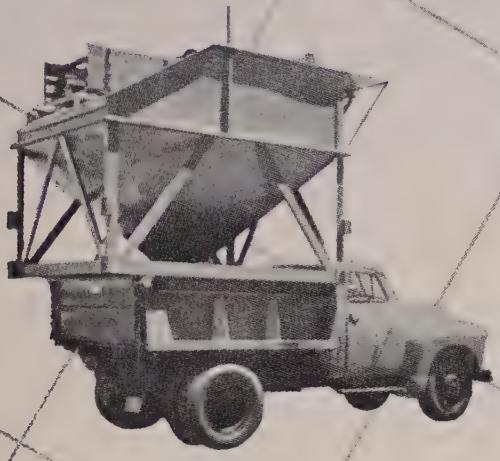
tle, received a $589,178 contract for grading and paving on 2.4 mi. of State Highway 1, in the city of Bellevue, King County. A $179,128 contract was received by **Pacific Sand & Gravel Co.** of Centralia, for surfacing and paving 12.1 mi. of highway in Clallam and Jefferson counties. **Calabrese & Sons,** Mercer Island, received a $328,801 contract for draining, grading and erosion control on 0.2 mi. of the Seattle Freeway, King County. **DeAtley-Overman, Inc.** of Lewiston, Idaho, received a $182,003 contract for grading and surfacing on various sections of the Stevens County roads. **Cherf Bros., Inc. & Sandkay Contractors** of Ephrata received a $141,536 contract for 1.4 mi. of grading and surfacing, Ephrata Wye to Ephrata in Grant County.

WYOMING

Wyoming Paving and **Asbell Brothers Construction Co.,** Casper, received a $927,417 contract for grading, surfacing and structures on 5 mi. of the Casper-Muddy Gap road, southwest of Casper in Natrona County. **Etlin Peterson Construction Co.** of Casper received two contracts for roadwork in Johnson County: $660,433 for construction of a bridge over Powder River and miscellaneous work on 4-lane divided highway between Buffalo and Gillette, and $139,230 for 1 twin concrete separation structure. **Forgey Bros. Co.,** Casper, received a $428,339 contract for grading, surfacing and related work on 2.7 mi. of four-lane divided highway on the Buffalo - Gillette road in Johnson County. A $361,575 contract was received by **C. A. Reeves Construction Co.** of Sheridan for grading, surfacing on 2.2 mi. of 4-lane divided highway in Johnson County. **Knisely-Moore Co.,** Douglas, received two contracts for work in Laramie and Platte counties: $350,983 for grading, surfacing and related work on 4 mi. of 4-lane divided highway between Laramie and Cheyenne in Laramie County, and $272,198 for grading, surfacing and draining on 2.5 mi. between Glendo and Wheatland in Platte County. **Big Horn Construction Co.,** Sheridan, received a $218,598 contract for 12.6 mi. of grading, surfacing and miscellaneous work on U. S. Highway 14 and 16 in city of Gillette, Campbell County. A $189,858 contract was received by **Carl E. Nelson Construction Co., Inc.,** Logan, Utah, for 10.5 mi. of grading and surfacing on the Cokeville-Border road from Cokeville northwest in Lincoln County.

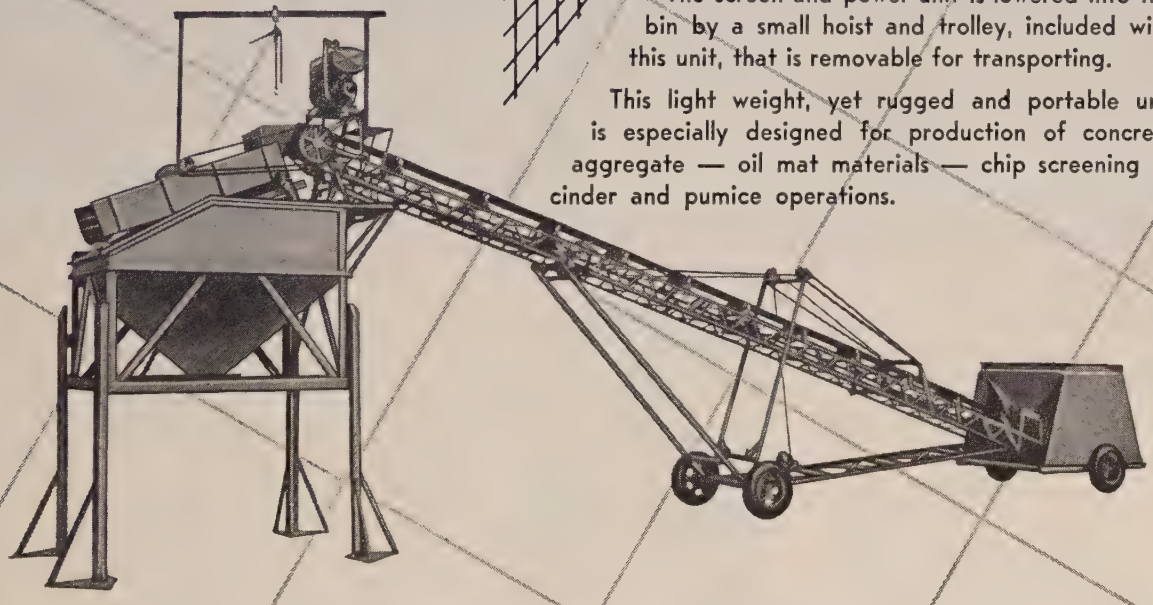
PORTABLE SCREENING PLANT



The Miller & Smith 80 THP can be completely dismantled or set up within two hours with only a dump truck for hoisting, equipment and hauling the bin and towing the feed trap. The conveyor is towed by an additional truck or pick-up.

The screen and power unit is lowered into the bin by a small hoist and trolley, included with this unit, that is removable for transporting.

This light weight, yet rugged and portable unit is especially designed for production of concrete aggregate — oil mat materials — chip screening or cinder and pumice operations.



42" x 96" double deck vibrating screen mounted to adjust to proper angle for all types of material and screening conditions — screen lowers into bin when transporting.

25" HP gasoline engine with V-belt and gear reduction drive to conveyor and screen — lowers into bin for transporting.

Demountable light weight hoist and trolley to handle screen and power unit for dismantling and erection.

12 ton, two compartment bin with adjustable partitions and demountable legs — lever operated knife gates. Transport dimensions 8 feet wide — 10 feet long — 7½ feet high. Transport conveyor dimensions, 53 feet long — 13½ feet maximum height — mounted on 7.50 x 20 tires and standard 6 hole Budd wheels.

Write for further information and brochure.

Miller & Smith

Mfg. Co., Inc.

500 PHOENIX AVE., NW — STATION B, BOX 6007
ALBUQUERQUE, NEW MEXICO

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ENGINEERS and CONTRACTORS

THE 1960 edition of ARBA's convenient, pocket-sized directory of "Highway Officials and Engineers" is now available for distribution. This new edition contains 2,000 names, titles and addresses of administrative engineers and officials in the fifty state highway departments, the state toll road authorities, the Bureau of Public Roads, as well as the officers and directors of ARBA. This useful directory is available at $1.00 per copy, net, from the **American Road Builders' Association,** World Center Bldg., Washington 6, D. C.

Robert T. Lawson, formerly a resident partner with Dames & Moore in San Francisco, has become a member of Harding Associates, San Rafael, Calif., soils engineering firm. Secretary of the San Francisco section of the American Society of Civil Engineers, and a member of the Structural Engineers Association of Northern California, Lawson has specialized in soils and foundation engineering throughout his professional career.

* * *

Robert F. Shapley, for the past five years manager of the Tacoma, Wash., Chapter of Associated General Contractors, has resigned to accept a position with the United Pacific Insurance Co. Replacing him at AGC is **Gerald C. Campbell** who comes from San Francisco where he was employed by Crown Zellerbach Corp.

* * *

Allen G. Terry, assistant chief of the Operations and Maintenance Branch of the Operations Division of the Portland District, has been selected to serve as a member of the Army Engineers' nation-wide study group. He is the only West Coast representative of the eight-man body which will study the operations and maintenance and rehabilitation program of the Corps' district offices civil works projects.

The Corps of Engineers, Seattle District, announces that a decision has been made to consolidate the Portland, Fort Lewis, and Seattle Construction Residencies into a Western Area Office at the Seattle District Headquarters. This office is assigned all functions formerly assigned to the residencies. Key staff assignments in an acting capacity are: **Major Roy L. Kackley,** deputy district engineer, is acting area engineer, with **Ray Aest** as acting assistant area engineer. **Charley Hartman,** Portland, is acting deputy area engineer for Oregon projects, and **Don Nelson,** Seattle, is acting deputy area engineer for all western Washington projects.

* * *

Bert Eldridge, who spent a lifetime in the installation of cableways on major construction projects, died recently at the age of 88 years. Affectionately known as

Cole

Pflugmacher

Smith

Snyder

Helgren

DIRECTING WORK AT MAYFIELD DAM

Completion of Mayfield Dam on the Cowlitz River in western Washington by the City of Tacoma has now been actively resumed following a five year delay due to legal problems. The 185-ft. dam was begun July '55 under a contract to Arundel-Dixon Co., with work interrupted by court action, finally settled by a decision of the U. S. Supreme Court. Successful bidder for completing the project was Perini Corp. with an award of $9,997,140. Engineering staff of the Tacoma Department of Public Utilities is headed by *Henry A. Cole,* major projects manager. *Carl F. Pflugmacher* is project office engineer and *Franklin Smith,* civil engineer.

Project engineer for Perini Corp. is *Robert Snyder. Robert His* was scheduled to take over the position of construction superintendent. *Hampton Roberts* is Pacific Coast manager for the contractor.

Harza Engineering Co. of Chicago is consulting engineer for the City of Tacoma. *Edward Helgren* is resident engineer.

Power production scheduled to begin at Mayfield Dam in 1962 will come from three 45,000-kw. generators, with a fourth to be added later.

Two veterans of the extensive hydro-electric program carried out by the City of Tacoma were *J. L. Stannard,* who directed construction of the Cushman dams from 1923 to 1931. He died in 1931. Later *Verne Gongwer* was chief engineer during the construction of Alder and LaGrande dams, retiring from city service in 1947. He died in November 1959.

SynchroTouch Transmission Control—optional on DW21 and DW20 Tractors.

NEW CAT SYNCHROTOUCH TRANSMISSION CONTROL STEPS UP PRODUCTION 10 TO 15%!

THE JOB: Site improvement for Marple-Newtown Jr. High School, Pa. Clearing and grubbing . . . cut and fill . . . moving 40,000 cu. yd. of dirt to level area around the school.

CONTRACTOR: Hugh Boyd, Inc., W. Conshohocken, Pa.

EQUIPMENT: Two Cat DW21G-470B units with SynchroTouch Transmission Control and one Cat D8H Tractor with Power Shift Transmission.

When this picture was taken, the job was 25% ahead of schedule. Owner Hugh Boyd gave most of the credit to his new Caterpillar equipment. He said: "The SynchroTouch Transmission Control on the DW21s increases production 10 to 15% due to faster operation and less operator fatigue. The Power Shift Transmission on the D8 cuts operator fatigue 30%, permits smooth contact with the scraper and takes it out of the cut in third gear with no hesitation to shift."

Have you checked what SynchroTouch Transmission Control can do for you? To shift gears, the operator simply dials the desired gear for automatic, split-second response. A standard foot clutch is used *only* when starting from standstill. Results: faster shifting for faster cycles and more payloads per hour. Lessened operator fatigue for more daily production.

Compared with previous models, the new 345 HP two-wheel DW21G and four-wheel DW20G Tractors deliver 12% higher rimpull producing up to 20% faster travel speeds under similar haul road conditions. Their new LOWBOWL Scrapers (470B and 456B, respectively) are rated at 19.5 cu. yd. struck; 27 cu. yd. heaped. With optional SynchroTouch Transmission Control, they're designed to move more dirt faster and cheaper than any competitive unit. Ask your Caterpillar Dealer to show how he can step up production for you!

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

BOOST PRODUCTION WITH SynchroTouch TRANSMISSION CONTROL

. . . for more details, write No. 52 on Reader Service Postcard

"Mr Cableway," he had spent many years with the Lidgerwood Manufacturing Co., from the early 1900's until his retirement in 1928. Following his retirement, he became a consultant on cableway design and installation, and remained active up to the time of his death. During this time, he was associated with important cableway installations on many Western projects, working with contractors, who have carried out these jobs.

During the past seven years, he has been associated with S. B. Bailey, and the S. B. Bailey Co. specialists in consulting service to the heavy construction industry.

* * *

Establishment of a United States headquarters in Portland, Ore., is announced by Swan, Wooster, Engineering Inc., a subsidiary of the Canadian company in Vancouver, B. C. The firm provides consulting services in civil, structural, mechanical and electrical engineering. The Portland organization is headed by **W. Pegusch,** manager.

* * *

To fill the vacancy resulting from the retirement of **Professor Roderick Downing,** the University of Colorado has named **Robert L. Schuster** of Purdue University as associate professor of civil engineering. In addition to teaching at Purdue, Schuster has had extensive experience with the Washington State Highway Department, the U.S. Geological Survey, the Joint Highway Research Project Concrete Laboratory, and the Corps of Engineers' Ice and Permafrost Research Establishment.

* * *

Myles C. McGough has been elected as executive vice president of Merritt-Chapman & Scott Corp., in charge of the Construction Department. McGough, who joined M-C&S in 1936 as a project engineer, succeeds **William Denny** who is retiring from active service with the construction firm following 32 years of service.

* * *

Clifford L. Mutch, Bureau of Reclamation construction engineer, retired in April. He had been with the Bureau for 33 years and is considered one of its ablest construction engineers. Mutch resides in Golden, Colo. He plans to enter private consulting practice.

* * *

William A. McAlister is the newly elected president of the architect-engineering firm of Thomas J. Davis, Inc., following affiliation of this firm with Engineering Service Corp., civil engineers, Los Angeles.

* * *

Harry Czyzewski of Metallurgical Engineers, Inc., has been elected president of the Consulting Engineers Association of Oregon for the ensuing year. He is also national director from Oregon to the Consulting Engineers Council.

* * *

William L. Sheets, manager of the Los Angeles office of Stone & Webster Engineering Corp. and general superintendent of construction in the eleven Western states, has been named senior construction manager, with responsibility for the administrative direction of all of the firm's construction department activities.

* * *

Earl T. Van Geem, assistant vice president, has been named director of engineering for J. H. Pomeroy & Co., Inc., San Francisco. Also reported is the appointment of **Fred H. Baastad** as manager of the company's engineering division, and **William J. Talbot, Jr.** as chief engineer. Van Geem's engineering career has been entirely in construction work. He joined Pomeroy as a field engineer in 1950.

Baastad headed his own construction firm for six years in Venezuela, then held various engineering posts in over-seas joint venture projects in which Pomeroy participated. Talbot formerly was chief engineer for Ben C. Gerwick, Inc., which is now a division of the Pomeroy company.

CALENDAR

Sept. 19-21—Annual National Highway Conference for County Engineers and Officials, sponsored by ARBA's County Division, Atlanta Biltmore Hotel, Atlanta, Ga.

Sept. 27-30 — Prestressed Concrete Institute, annual convention, Statler-Hilton Hotel, New York City.

Oct. 10-13—American Mining Congress Mining Show, Convention Center, Las Vegas, Nev.

Oct. 14-16 — California Association of Engineering Geologists, annual meeting, University of California, Berkeley.

Oct. 17-21 — National Safety Council, annual national safety congress, Chicago, Ill.

Nov. 28 - Dec. 2 — American Association of State Highway Officials, annual convention, Detroit, Mich.

A CERTIFICATE of Appreciation for Outstanding Services was presented jointly to the Hood Construction Co., Cherf Brothers, Inc., and Sandkay Contractors, Inc. by the U. S. Army Corps of Engineers, at Boise, Idaho. As a joint venture, the three contracting firms constructed 26 mi. of pipeline that brought from the Missouri River the water supply necessary for Glasgow Air Force Base in Montana and maintained a favorable schedule throughout the construction of the $2,235,121 project. Here *Barney M. Laulhere,* president of the Hood company, receives the award in the name of the joint-venture from *Col. Paul H. Symbol,* District Engineer, Walla Walla District, while *C. C. Davis,* chief of the construction division, shows his approval.

SUPERVISING the jobs

ON a large freeway project under construction in Tulare County, Calif., key personnel of contractor Gordon H. Ball and Gordon H. Ball, Inc., take a brief coffee break and pose for the camera. Left to right: Top row—*Curtis Luckcuck,* an equipment supplier and visitor to the job; *Oscar Barnes,* grade foreman; *Homer Holmes,* project superintendent; *Bob Davis,* blending plant foreman; *William E. "Bill" Brewer,* assistant project superintendent; and *Ernest "Spike" Gagle,* master mechanic. Bottom row—*W. C. "Slim" Wentworth,* pipe foreman; *Frank Dayton,* grade foreman; *Al Lee,* structures superintendent, and *Ad Smith,* carpenter foreman. A 6.4-mi. stretch of Highway 99 is being converted from expressway to full freeway with the constructing of concrete roadbeds for a divided highway, together with frontage roads, ramps and connections for 2 interchanges and 4 prestressed concrete girder bridges. A year-long job, the $1,795,176 project has been under construction since January.

William Hasse is supervising Gardner Construction Co.'s $614,-619 contract covering grading, surfacing and structures on 4 mi. of U.S. Route 89, Cameron-Navajo bridge highway near Cameron, Ariz. Carpenter foreman is **Harold Hasse;** foreman, **George Monks.** The project is expected to be finished in July.

* * *

Fay Granger, grade superintendent, and **Ronald Hjaltalin,** pave superintendent, under the direction of **A. B. Julian** and **W. S. Hjaltalin,** president and vice president respectively of Basin Paving Co., are supervising the repaving of 1 mi. of state highway in Pomeroy, Wash. The contract covers grading, draining, surfacing and paving with asphaltic concrete in the amount of $111,961. Work is scheduled for completion June 23.

* * *

Robert C. Johnston is superintending a recent award to Nelson Bros. Construction Co. to reconstruct an earthquake-damaged section of highway in Yellowstone National Park, Mont. Located on the North Entrance Road, the $152,347 job involves rock riprap, Armco bin wall, excavation, and some paving. Scheduled for July completion, work started in April.

* * *

Robert W. Kriese, superintendent, **George V. Massingill,** foreman, and **L. A. Nylund, Jr.,** project engineer, are key contractor men on a $134,421 job under way in Phoenix, Ariz. T. M. K. Construction Co., headed by **P. E. Tovrea, Jr.,** is doing the work, which includes about 2 mi. of grading, draining, select material, aggregate base, bituminous stabilized base and emulsified asphalt seal coat. Started in March, the job will be complete in July.

* * *

Robert Williams, crushing superintendent, **John Compton,** oiling superintendent, and **Waldo Farnham,** oiling foreman, a supervising trio under the over-all direction of **G. L. Compton** of the construction firm of J. C. Compton Co., are in charge of 7.7 mi. of grading and surfacing on a section of Burnt Hill-Brookings highway in Curry County, Ore. Crushing, placing base rock and oiling, and stockpiling of paving aggregates are included in the $363,070 contract, which got under way in April and will be finished about September.

John Compton, assisted by Farnham, is also superintending the oiling on a stretch of the Antelope Creek road, north of Madras, on which Frank Baulne, Inc. is handling the crushing and leveling course. Work here will be finished in August.

* * *

Eugene Theimens is superintending Sather & Sons' recent award at $151,524 to do 2.3 mi. of construction on the Clark Fork Highway (FHP-Project 6-D5) in Montana. Grading and riprapping of bridge approaches is included in the contract, on which **Pete Bina** is employed as master mechanic.

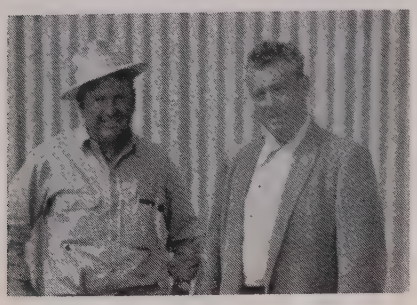
* * *

Clyde Weatherly, bridge foreman, **Carl Folger,** road foreman, and **Richard G. Henderson,** foreman, comprise the top personnel on a contract recently awarded to Hunt Construction Co. on a low bid of $151,520. Involving 2.3 mi. of grading, surfacing and I-beam structure, work is situated north of Parkdale in Fremont County, Colo. Soon to be finished, job has been going on since March.

* * *

Leroy Adams, superintendent for Siegrist Construction Co., has charge of $156,621 worth of grading, gravel and plant-mix surfacing, with structures, near Dacona in Weld County, Colo. Now in the finishing stage, contract has been under way since Mar. 1.

Frank Arentz (right) and **Horace Bell,** project manager and job superintendent respectively, head the personnel working for Claude C. Wood Co., successful bidder on 4.8 mi. of grading, surfacing and



Bell *Arentz*

related work on Route 88 north of Clements in San Joaquin County, Calif. Grade foreman is **Bob Cawelti.** The $340,568 contract which has been going since April is scheduled for completion in September.

* * *

John Tryon, excavating superintendent, together with **Fred Roberts,** and **Ray Senior,** the project engineer, are key men on a $3,008,147 contract recently awarded to S. S. Mullen, Inc. to construct complete communications facility at Hoonah near Juneau and Lena Point, Alaska. Work started in mid-April, earmarked for completion Nov. 1.

* * *

C. L. Beedle has been named by General Investment Co., of which **P. B. Lutz** is president, to superintend construction of 330 Capehart housing units at Larson AFB in Washington. Included in the $5,395,000 contract are streets, utilities and landscaping. Scheduled for completion in October 1961, work got under way in May.

* * *

Bill Frazer is job superintendent on a $484,014 award to Peter Kiewit Sons' Co. for 17 mi. of hot-mix and seal-coat surfacing on the Lima-Monida road in Beaverhead County, Mont. Hot plant foreman on this Interstate job is **Bill Dalry.** Started in May, job will close in September.

* * *

Charles Loser, general superintendent for Northwestern Engineering Co., is in charge of grading, surfacing and related work on the Rock Springs-Rawlins road east of Point of Rocks in Sweetwater County, Wyo. Field clerk for the contractor is **Gene Boggs.** This $1,797,328 project is slated for completion next April. Work started last April 1.

* * *

W. J. Parson, general superintendent, has charge of Jack B. Parson's recent contract award covering grading on Interstate Highway IN15 and IN80 from Honeyville to Elwood, Box Elder County, Utah. Project engineer for the contractor is **C. M. Fonesbeck. Doe Hodges** is grade superintendent; **Joe Richardson,** fence and pipe foreman, and **Roy Wendt,** equipment superintendent. Parson is moving 9,000 cu. yd. excavation per shift, using the following equipment: No. 608 Link-Belt 3½-yd. dragline; 5 DW20 scrapers; 3 SS24 Euclid scrapers; 1 Twin-C pusher; 2 TD24 dozers; 1 D9 dozer, 4 D8 dozers, and a Michigan ½-yd. backhoe. The $463,337 job will be finished in August.

Work on Parson's flood control contract with the Corps of Engineers on the Snake River at Jackson, Wyo., is now completing. **Ronald Hadfield** was in charge here. Completing soon, too, is an Interstate project at Rattlesnake Pass, on which **Robert Phillips** supervised construction.

* * *

W. W. Leaverton is superintending for Silva & Hill Construction Co., and **John Banks** is Jack L. Adams Construction Co.'s superintendent, on a joint venture contract covering about 8.5 mi. of divided freeway to be graded and surfaced with PCC on cement-treated base, asphaltic concrete on cement treated base, and 12 bridges to be constructed. The 4-lane freeway is on US 101 west of Santa Barbara, Calif. Contract was awarded to the combined contractors on a low bid of $3,768,522. Work started in March and will run till November 1961.

* * *

Wayne L. Manweiler, project manager, **Dan J. Moats,** general superintendent, and **Hughbert Raper,** superintendent, comprise Bentson Contracting Co.'s chief personnel on a $1,583,358 recent award for 2.6 mi. of grading, surfacing and related work on State Route 69 near Phoenix, Ariz. With May 1961 the target, work started in April.

* * *

S. J. Kolar, project manager, and **Gene Hendrickson,** superintendent, are key men on construction of a $1,135,000 reinforced concrete building going up at the University of Washington in Seattle. James I. Barnes Construction Co. started the work May 1, and expects to finish about September next year.

* * *

R. L. Moss is project manager, and **Ed Nicholas,** superintendent for a channelization project at 8 intersections on Highway 2 between Kenmore and Bothell, Wash., a $183,780 award to R. L. Moss & Co. Grade foreman is **Al Seitsinger, B. Hopper** is master mechanic, and **Howard Hill** and **Frank Letts** are head operators. Scheduled for completion Aug. 10, work started on April 12.

* * *

Ralph J. "Tuffy" Jones, project manager, **Lonnie D. Herron,** project engineer, and **Mark Rosandick,** office manager, comprise the chief personnel working on Interstate highway construction under way by Morrison-Knudsen Co., Inc. in Utah County, Utah. This is a $1,392,390 job of 4.9 mi. of grading, surfacing and structures on Highway 15. Earmarked for completion next May, work has been going on since April.

* * *

Tom Martin is superintending a contract for grading and surfacing on 1.2 mi. of the Garrison-Helena road in Powell County, Mont., which went to Stanley H. Arkwright on a low bid of $165,321. Work is now in the completing stage.

* * *

Arch Edmonds, superintendent, is in charge of construction of an interchange on US 50 east of Sacramento, Calif., including a bridge, for Fredrickson Brothers, contractor. Field office manager for the $447,829 contract is **Frank King.** Work started in March and will be finished in the fall.

* * *

George Swannack, Jr., Robert M. Carroll, and **Donald Tiede,** all officers in the contracting firm of Inland Asphalt Co., are directing operations in the reconstruction of 7 blocks of city streets in Spokane, Wash. The $192,808 project has been under way since April and will be finished in mid-August.

NEW PORTABLE I-R HOIST

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I-R's new, rugged, but compact K6U Hoist easily handles heavier loadings which ordinarily tie up cumbersome cranes and other expensive equipment. It can handle bigger loads than any other single drum air hoist on the market. Yet you get the same adaptability and light handling characteristics that made its smaller predecessors real time and money savers on materials handling jobs in all industries.

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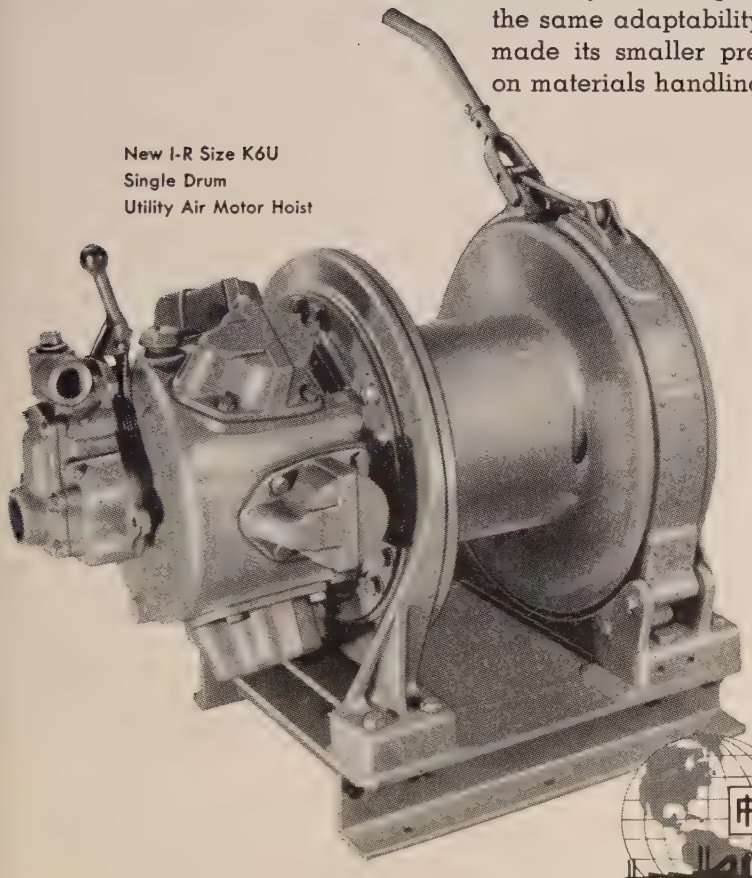

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Hoist has reversible 6-cylinder Air Motor with safety-type throttle which shuts off automatically when released. Reversible motor permits full control of suspended loads with throttle only. (Remote control equipment optional.) Can be mounted in any position for a wide variety of lifting and pulling jobs.

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Arnold Blair, superintendent, and his assistant superintendent **Ed Dempsey,** are in charge of construction of a portion of US 95 in Mineral County, Nev., for Isbell Construction Co. Other key men on the $1,262,698 project involving rock excavation, gravel and plant-mix paving, are **Jesse Robinson,** drill superintendent, and **Jim Blair,** grade foreman. Scheduled for completion in October, work started in April.

* * *

Ralph F. Maloney is serving as general superintendent of construction of a prestressed concrete piling dock, contract for which was awarded to General Construction Co. at a cost of $1,665,854. This is the first part of a multi-phase construction to replace 3 piers of the Port of Seattle's terminal. Office engineer is **W. H. Epping,** and office manager is **R. H. Savage.** Contractor has scheduled the job for completion in January 1961. Work started in April.

* * *

Ralph E. Campbell, project superintendent for N. P. Van Valkenburgh Co., Inc. and Gunther & Shirley Co., is in charge of installation of an 18-mi. long pipe line for the California Department of Water Resources and the City of San Luis Obispo. The joint-venture is installing 30, 24, and 12-in. steel and concrete pipe and related appurtenances under a $1,743,360 contract. Other important contractor men here are **C. J. Richardson,** project engineer; **William E. Wheelus,** project estimator, and **G. Y. Eaton,** office manager. Principal foremen are **Jack M. Thompson, Arley A. Parks,** and **Paul E. Mingo.** Under way since April, work is expected to be finished in January 1961.

* * *

Dale Haselwood, superintendent, with the assistance of **Clarence Schriner,** grade foreman, and **Joe DeGani,** mechanic, is in charge of a $295,107 contract recently awarded The J. P. Elliott Co. A 120-day job, contract is for 2.8 mi. of grading, surfacing and structures on the Black Canyon Road-east to foot of Cerro Summit, State Highway 6, in Colorado. April 3 was the starting date.

* * *

Gordon McGrew has been named by the Griffith Company to superintend its recent freeway award in Ventura County, Calif. This contract, costing $8,209,756, is for grading and surfacing on 4.7 mi. of 6-lane freeway on US 101 in and near the city of Ventura. Bridge superintendent on the project is **Carl McCracken;** general foreman, **Jess Bittner;** bridge general foreman, **Arlie McCracken,** and mechanic, **Dan Alwerth.** Last February was the starting date. **J. F. Porcher,** project manager, figures the job will be finished by January 1962.

* * *

Emil Storm, superintendent, and **Jeff McQueen,** engineer, head the job personnel of Rothschild, Raffin & Weirick, the successful bidder for Phase 1 of Administration Building in San Rafael, Calif. Costing $3,845,000, the structure contains 178,000 sq. ft. consisting of 4 floor levels, with 150-ft. aluminum ornamental tower. Contractor started work in April and expects to be finished about March 1962.

* * *

A. D. Drumm and **J. V. Beach,** general manager and superintendent respectively, are in charge of Silver State Construction Co.'s $278,525 contract to widen underpass and approaches of a portion of state route in Las Vegas, Nev.

* * *

H. C. "Ole" Olson, superintendent for Reed & Martin. Inc. and Burgess Construction Co., has charge of constructing 1 2/3 mi. of access road, radio relay building, and erecting 50-ft. microwave tower at Canyon Creek, Alaska. The $211,360 project has been in progress since May 1 and will be finished about the middle of September.

* * *

C. T. Houck, project manager, aided by **Swen Lobeck,** crushing foreman, **Harold Widner,** paving foreman, and **Bill Cole,** master mechanic, has charge of a crushing and paving job just starting by Roy L. Houck & Sons' Co. Work consists of 4.2 mi. of 4-lane expressway on Pacific Highway from the McKenzie River to Willamette River in Lane County, Ore. The $1,392,693 job is expected to be finished in October.

* * *

R. J. Schurger is supervising a $474,436 contract which recently went to Roth Construction Co. for grading, surfacing and other work on 3 mi. of 4-lane divided highway in Sheridan County, Wyo. Construction started in April, with the following foremen on the job: **D. Wick** and **J. Noel,** shift; **F. Lahn,** labor, and **L. Heller,** maintenance. Job will be ended in August.

* * *

Arthur Chinn, superintendent, **Otis Van Blaricom,** business manager, and **R. Hunter,** engineer, are top men for Keystone Construction Co. which is doing 9.9 mi. of clearing, grading, fences and culverts, rocking, and binding oil on the Baker-Pleasant Valley section of the Old Oregon Trail in Oregon. This is a $1,560,015 project on which work started April 1, earmarked for finish June 1, 1961.

* * *

E. Gischel is supervising construction of a 1-story masonry and steel frame hospital at Glasgow AFB in Montana. Other key men on the $1,972,625 structure under way by Baltimore Contractors, Inc., are **J. Henry Smith,** office manager, **William McGinnis,** carpenter **foreman, Victor Norcross,** engineer, and **Sal Manfre,** assistant engineer. Job started in April; will probably end July 1961.

* * *

George M. Schweizer, project manager, **George Carr,** superintendent, **Leroy Bright,** project engineer, and **Olbert Frey,** office manager, head the list of job personnel working for Stanley Wilt, successful bidder for grading, and an 88-ft. concrete bridge on the Paulina highway in Crook County, Ore. The $264,099 job has 180,000 cu. yd. common excavation, 7.4 mi. oiling, and crushed rock base of 91,000 tons. Slated for completion in September, work has been going since April.

* * *

John Compton is superintending a job near Hood River, Ore., covering grading, grid-rolled base, leveling course base and oiling, a recent award to J. C. Compton Co. on a low bid of $117,041. Foreman on the work, which will be complete sometime in August, is **Waldo Farnham.**

* * *

"Whitey" Jacobson, superintendent for E. L. Yeager Co., is in charge of an asphalt resurfacing job being carried out by E. L. Yeager Co. The $227,475 contract covers grading and surfacing now

TOUGH ROCK. On this Rocky Mountain excavation nearly all of the rock was badly fractured and schisted as well as being highly abrasive. Bits lasted an average of only 15 feet. This job was done with crawler drills powered by a battery of Jaeger "600" compressors.

Jaegers cut air costs on tough 1,300,000 cu. yd. Rocky Mountain excavation

A Jaeger rotary "600", using the same GM 6-71 diesel engine as used in other "600" rotaries, delivers its rated capacity at 100 rpm slower speed — 1700 instead of 1800. In an 8-hour full-load operation, the Jaeger's engine does its work in 48,000 fewer revolutions.

Because it runs slower, it saves miles of engine piston travel and pounds of fuel every working day. The engine requires less maintenance . . . lives a longer operating life.

The compressor unit in a Jaeger lasts longer, too. 8000 hours without a vane replacement is not unusual. Ask any Jaeger owner; ask your Jaeger distributor — or send for new catalog JC-O.

← **LOW COST AIR FROM THIS "900", TOO.** The Jaeger "900" uses the same GM 6-110 diesel engine as other "900" rotaries, yet it produces its rated capacity at 100 rpm slower speed (1700 instead of 1800). Consequently, a Jaeger "900" produces more than 500 cf of air per pound of fuel. And it needs less maintenance, has a longer life. Other Jaeger models, from 75 to 365 cfm, are of comparable efficiency.

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CONTRACTORS EQUIPMENT SUPPLY COMPANY ..... Boise, Idaho
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CENTRAL MACHINERY COMPANY ..... Great Falls and Havre
WORTHAM MACHINERY CO. ..... Cheyenne, Wyo.

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finishing at various locations in San Bernardino and Riverside counties, Calif.

* * *

Dan Moats and **Frank Powell,** general superintendent, and superintendent respectively, are Bentson Contracting Co.'s chief men on a grading and surfacing project involving 30,000 yd. roadway excavation, 30,000 tons select material, and 24,000 tons aggregate base on a 6-mi. stretch of the McKellips-Power road in Maricopa County, Ariz. The $167,936 job has been under way since May 9, and according to Project Manager **Wayne L. Manweiler,** will be finished about Aug. 9.

* * *

Perry E. Peyton is supervising the work for Charles M. Smith, contractor who successfully bid construction of five concrete boxes, guard rail and delineators on 1.3 mi. west of Wamsutter, Wyo. Peyton has as foreman **Carl Neville,** concrete, and **Harley Wiley,** labor. The $160,507 job is now finishing.

* * *

Hubert Hopkins and **Lee Roy Clark,** superintendents for D. W. Hopkins, are in charge of this contractor's $132,620 job consisting of grading, plant-mix surfacing and related work on 7.9 mi. of highway southwest of Torrington, Wyo. Construction is now finishing.

* * *

William C. Champion is supervising construction of Rearward Communication Facilities, a $581,956 award in the hands of Walsh & Co., Inc. Located at Boswell Bay, Alaska, the contract is being executed for the Alaska Air Command; has been under way since May 1, set for completion the middle of October.

* * *

Keith L. Stone, project manager, and **Jack Cochran,** superintendent, are head men employed by Wells Cargo, Inc. on construction of a portion of secondary highway in Clark County, Nev. The $433,167 contract covers grade, pave, concrete curb and gutter on 6 mi. in Las Vegas. Job started in June and Stone has it scheduled for November finish.

* * *

Ed Dempsey, superintendent, with his assistant, **Bill Richards,** is in charge of construction of a portion of primary highway in Mineral County, Nev. Successfully bid by Isbell Construction Co. at a cost of $1,262,698, the project has the following key foremen: **Jim Blair, Bert Fernandes,** and **Jim Avery.** Earmarked for October completion, the work got under way in April.

TUNNEL SURVEY

(Continued from page 76)

made the final alignment check into both headings. Precise levels and chaining were also extended to monuments which were established within 200 ft. of each heading. The contractor was advised when the headings were calculated to be within 40 ft. of each other. Sound of drilling indicated this approach and for several days it had been necessary for each crew to stop work and move back a safe distance when the opposite headings was blasted.

When the headings were within the 40-ft. distance, operations were suspended from one and the crews completed the work from the other. Drilling of a pilot hole between the headings was completed January 1, 1960 and the following day the remaining rock was removed. This connection was located 5.1 mi. from the portal and 3.1 mi. from the shaft. Results of the precise survey closure showed:
Discrepancy in alignment — 0.12 ft.
Difference in grade levels — 0.12 ft.
Discrepancy in stationing — 0.21 ft.

East leg was tougher

In the other heading toward the east, where the tunnel passes under the Continental Divide, the surveying conditions were more difficult. Temperatures increased at an approximate rate of one degree Fahrenheit for every additional 100 ft. of cover, and before the tunnel was holed through the air temperature was 83 deg. The cooler air from the ventilating system and the compressed air line created heavy fog that drifted back and forth in the tunnel. Also, several control monuments located in disintegrating or shifting materials required replacing. These adverse conditions, together with the air turbulence created by electric motors and transformers installed at frequent intervals caused much more concern for the survey crews and made necessary many re-surveys.

Because of these conditions, the final alignment check for the tunnel heading running toward the shaft from the east portal was commenced several months before hol-

ing-through. Only minor line adjustments were required in the first three miles from the portal, but from this point the existing line was found to be gradually bearing off to the north. When the precise line was projected about 6 mi. from the portal the discrepancy in the existing line, on which the tunnel was being driven, amounted to 2.17 ft.

Finally, at a distance of 8 mi. from the portal, it was impossible to continue projecting this precise line because of a ventilating booster fan on the line of sight. Various survey procedures were used in determining the variation in the line beyond the booster fan with the precise line produced from the portal.

When the tunnel had been advanced to about 1,500 ft. of the holing-through station an angle point was established a short distance from the face for correcting the tunnel alignment. A calculated discrepancy in the alignment between this angle point and the last monument in the tunnel driven from the other direction was 6.98 ft., and the computed angle for correcting the alignment amounted to zero deg. 17 min. and 15 sec. Final adjustment in the tunnel stationing was also made at the angle point.

On February 22, 1960 the faces were about 50 ft. apart, and a pilot hole was drilled through this gap, with the error in line found to be about 3 ft. To correct for part of this discrepancy in alignment, the steel panel supports were shifted as the excavation was advanced to the holing-through points. The last supports set by the crews in the portal face was within 4 in. of grade and only 14½ in. off the corrected tunnel line. This holing-through station was about 10 mi. in from the portal and 4.8 mi. from the access shaft. Results of the precise survey closure were:

Discrepancy in alignment — 3.25 ft.
Difference in grade levels—0.343 ft.
Discrepancy in stationing—4.533 ft.

Personnel

The precise survey party was supervised by W. B. Waltman, Jr., chief of party, assisted by Luke Lindsay and Frank Vinyard, resident engineers. The instrument work was performed by D. D. McNutt, Jr., senior instrument man. Considerable credit is also given to A. B. Reeves, assistant construction engineer for his valuable assistance and guidance.

CONSTRUCTION BRIEFS

Small trailer hauls and dumps ready mix

SELF-DUMPING trailers of 1 cu. yd. capacity have been developed by a Phoenix, Ariz., man for supplying ready-mix concrete in small quantities to contractors for small jobs, and week-end do-it-yourself project.

The two-wheel trailers have covered hopper bodies and a hydraulic jack for easy dumping. The unit includes a special draw bar which clamps to an auto bumper, providing the post of a conventional ball and socket trailer hitch.

Developed by John J. Ehlen, the concrete trailers are used by his recently-formed Trail-A-Mix Co. Inc., of Scottsdale, Ariz., to supply small lot concrete to customers in the Phoenix area.

Concrete is prepared in a compact batch mixing plant geared for needs of one-yard users, producing completely mixed concrete. The firm offers any desired formula, either plain or in colors.

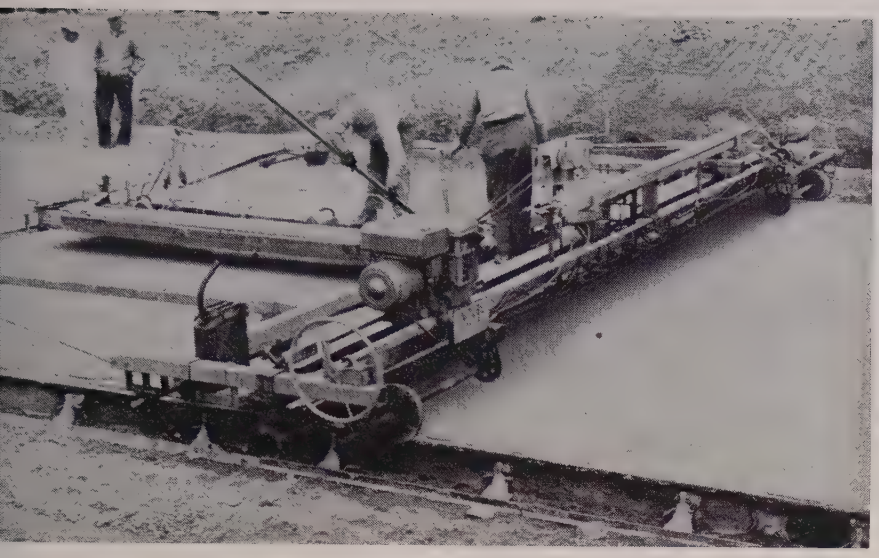
Trailers are kept at the plant. Customer can drive to the plant, pick up a trailer and have it filled with ready-mix and return home with a minimum of delay.

The operation is not competitive with large commercial plants in the area, and is in fact welcomed by the bigger ready-mix producers who constantly get calls for small loads of concrete, and must turn them down because such service is uneconomical and often impossible with big, heavy transit trucks.

Numerous advantages of the small-lot service are cited for contractors who can dispatch a pickup truck to the plant and get enough concrete for a small forming job without loss of time in hand mixing or advance scheduling of a transit delivery.

TRAILER shown in dump position, has special mechanical device for unloading. One-yard capacity unit supplies ready-mix for small jobs. Drawbar attaches to bumper.

BATCH plant measures and mixes concrete in 1-yd. batches for small contract jobs and week-end do-it-yourself patio and driveway builders. Built for Trail-A-Mix Co. in Scottsdale, Ariz.



IETAL strips to form longitudinal joint applied with "Planter," machine which forms roove in fresh concrete with vibrating T-bar and inserts flanged strips.

CONTROLLED CRACKING of slab with metal insert shown.

Crimped metal strip forms joints in concrete pavement

A NEW METHOD of forming oints in concrete pavement, involving use of a folded metal strip nserted in the fresh concrete has een developed by the Middlestadt Corp. Strip forms a deep V in the oncrete. Later its top is crimped y running a heavy wheel over it o form a shallow depression to reeive regular sealing compound.

The insert, called "Unitube," is hollow strip of lightweight galanized steel. The top is ⅜ in. ide. The 2¼-in. sides taper to ether at the bottom to permit asy insertion into the wet conete. Each of these flanges turns utward and upward at the bottom o form a claw, imbedding each de of the flexible metal insert to slab so that it spreads when racking occurs.

The folded metal strips are produced in 2-in. and 3-in. depths to neet various state and government pecifications and are pre-cut to dered lengths. Ten-foot lengths, hich interlock end-to-end, are inalled to form the longitudinal oint. Transverse joints are placed rom the side forms to the centerne where they butt against the ongitudinal joint. Easy to handle, he tubing is installed rapidly.

A two-man crew works from a pecially designed rig-dubbed "The lanter"—which rides the forms beind the contractor's paving train. his machine provides guides for ccurate placement of the Unitube. A vibrating "T-Bar" device is used to form a groove in the fresh concrete and then push the Unitube to the proper depth. The ⅜-in. wide flat top is left flush with the finished surface.

After the curing period, a one-man operated mechanical vibrating machine called a "Crimper" is run down each joint, folding the top of the metal tube inward and downward. This produces a joint ½ in. deep to carry the sealing compound. Sealing is accomplished by normal methods, except that less material is required to provide a water-tight joint with the permanent Unitube in place, and the operation moves faster.

Quick acceptance of the Unitube method as an alternate to hand-forming or sawing has been sparked by contractors who have discovered the cost advantages and by pavement technologists who like the idea of a "mechanical" insert which functions with the continually expanding and contracting slabs and holds the sealer up where it belongs.

The major design advantage to engineers familiar with the troublesome history of joints is that the folded metal insert creates a joint depression of the right size. Recent research has established the fact that sealing compound in a groove that is wider and shallower than the traditional deep, narrow cut suffers far less internal strain when the opposing slabs contract, and is thus less likely to f il and lose its bond to the concrete.

The new insert forms a barrier to prevent migration of sealer to the sub-base during hot weather.

Twelve state highway departments have authorized its use, and the U. S. Navy, Army Corps of Engineers, and Air Force have approved its application on major airfield paving projects in Texas, South Carolina, Maryland, and Pennsylvania.

The Middlestadt Corp. reports that production facilities are being expanded to meet a demand for $1 million worth of the metal inserts this year. The company also manufactures the equipment needed for installation. . . . ***Write No. 250***

How to maintain equipment seats

A booklet available from the **Bostrom Corporation** explains with diagrams and photographs the simple steps for good preventive and corrective maintenance of "Level Ride" 80 torsion spring suspension seats.

The eight-page manual shows how the company's suspension seat will outlast an ordinary truck seat with the minimum of care and maintenance always required of mechanical equipment with several moving parts. Points of possible eventual wear are pointed out and the easy replacement procedures clearly detailed.

The booklet also explains the methods of installation, the proper operating procedures, and provides a handy check list for optional equipment and replacement parts.

. . . ***Write No. 156***

MASTER MECHANIC®

Heavy duty electrical systems described for diesel rigs

HEAVY-DUTY electrical systems, including fully transistorized voltage regulators, that will keep pace with today's long lived diesel engines were described by Don Stewart, Delco-Remy field service engineer at the June meeting of the Bay Area EMSA.

Current electrical gear has a working life only half as long as the engine itself, Stewart said, and the necessity of frequent electrical overhauls is a major expense factor for owners of heavy equipment.

Bay Area

To remedy this difference in overhaul periods, Stewart said his company has developed a number of electrical system components which will keep pace with engine endurance, and in some cases outlast the engine.

These include a series of AC generators, some of them totally enclosed and cooled by an exterior fan, with bigger bearings, seals and oil reservoirs together with nylon insulation and other heavy-duty construction details. Stewart recommended the AC system, particularly for units using electrical accessories such as radio transmitters at idle engine speeds.

Voltage regulators in the Long Life equipment line range from conventional types with double posts and exterior adjustments to the newest transistor model which has no moving parts and should last indefinitely.

The service engineer also described a new cranking motor with beefed-up mechanical components and a universal type mounting flange which permits one basic motor to be used with several types of diesel engine.

Stewart said the Long Life brand equipment costs about 25% more than standard electrical components but has twice its operating life between overhauls. The importance of this reduced mainteance was emphasized by the distributor service manager who observed that tractor owners spend an average $300 a year on electrical maintenance alone.

During the question period, Stewart answered a number of queries on batteries and battery maintenance. He condemned so-called battery additives which he said were invariably solutions of epsom salts and water which do no good and often some damage to the battery. He noted that distilled water is no longer recommended.

A good indicator of battery failure or electrical system overload is battery water consumption. He urged that records be kept on addition of battery water.

Stewart outlined a quick test of battery condition under light load. First step is to run the starter 3 sec. and the headlights 1 min. Next, check each cell with a volt meter. At least one cell must show 1.95 or more volts for the test to work. Then, if there is less than .5 volts difference among all the cells, the battery is good. If more than .5, it is bad.

BIG TIRE SERVICE TRUCK HANDLING this rubber giant, which stands 10 ft. high and weighs nearly three tons, becomes a relatively simple task with the new "big tire" truck. E. C. Shoman of Goodyear's highway transportation department demonstrates how one man can operate the equipment, designed by *George Body & Trailer Co.* The tire, which is the world's largest and contains enough rubber for over 300 passenger car tires, was produced by *Goodyear* for earth-moving equipment. The new truck is custom built and mounted on a chassis of the four-wheel-drive type.

EMSA chapter organized in Honolulu

TWELVE Honolulu maintenance supervisors have organized a Honolulu branch of the Equipment Maintenance Supervisors Association with Danny Kanainau of Honolulu Iron Works as president.

Honolulu

The chapter was formed on the suggestion of Ralph F. Currier, service manager of Shaw Sales and Service, Los Angeles, who discussed it with Kanainau during a trip here, he said. The chapter is still in its formative stage.

Other officers are James McKenna of Hood-Thompson Construction Co., first vice president; Masaki Suematsu of Gilbert Gobatake, Inc., second vice president; Mamoru Goshi of A. C. Chack, Ltd., secretary, and S. Nakamoto of J. M. Tanaka, Inc., treasurer.

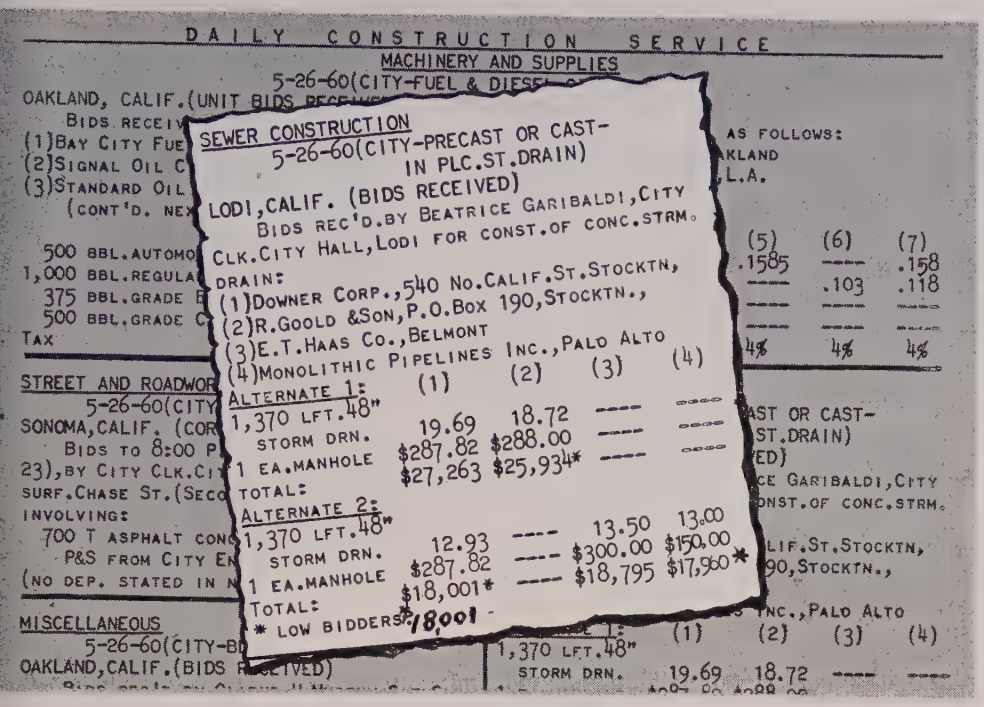
The group will hold monthly meetings and will be open to maintenance supervisors and others interested in their problems, Kanainau said. As on the Mainland, persons indirectly engaged in maintenance work may become an associate member, he added.

Multipurpose lubricant developed

A NEW MULTIPURPOSE automotive lubricant for commercial and fleet operation, construction and other heavy-duty motive equipment, has been announced by Shell Oil Co.

Shell Darina Grease AX is designed to lubricate mobile equipment under adverse and extreme climatic conditions. The lubricant is based on a new waterproof Microge thickener developed in Shell research.

Sixteen large scale operators of heavy-duty automotive equipment participated in a major field test program conducted by Shell. More than a thousand items of motive equipment were used in the program. Service conditions included city and over-the-road commercial vehicle operation—and heavy-duty equipment in such service as forestry, agriculture, construction, oil



Get Low Bid & More Profit with *NO-JOINT* Concrete Pipe!

ONTRACTORS: Are you making the *profit* ou should on concrete pipe installations?

Here is how you can *increase profit,* and till have *low bid* on the big jobs. When ou install *100% perfectly bedded* NO-OINT Conduit you produce a *highest uality* product at *lowest cost.* You *elimi-ate* the high cost of *back filling and tamp-ng* to the spring line. There's no hauling nd handling of pipes, and less trenching, ackfilling, black top and labor cost is *reatly reduced.* There are *no pipe inven-ories* to maintain; *no capital investment ventories* to tax!

NO-JOINT can put you in the concrete ipe manufacturing business for as little s $15,000. When you are a NO-JOINT istributor, you add *manufacturer's profit* your normal contractor's profit!

erritories: **Profitable NO-JOINT territories are ailable. Write or phone for information on ensed territories or rental of equipment today.**

ENGINEERS: Cast-in-place, Roman arch design NO-JOINT Concrete Pipe can *save up to 30%* of your concrete pipe dollar! *Saves on maintenance,* too, because there are *no joints to spring leaks.*

NO-JOINT Conduits have the *smoothest flow line;* efficient, clean-line design all the way! *Hundreds of miles* of NO-JOINT pipe now in use for storm drains, sanitary outfall sewers, culverts and irrigation projects. Sizes from 24" up to 72" ID.

Flexural strength of extruded NO-JOINT Concrete Pipe is *uniform* throughout its length. Bearing loads are *uniformly resisted* and *joint leaks eliminated.*

Government Engineers: save taxpayers up to 30% on concrete pipe projects!

Consulting Engineers: save your clients up to 30% on concrete pipe costs!

Free Catalog: **Large, colorful catalog graphically describes the NO-JOINT Cast-in-place process. Write for your free copy today.**

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Wm. Lynch Pipeline Construction,
P.O. Box 425, Dixon

COLORADO-KANSAS
Colorado No-Joint Concrete Pipe Co.,
P.O. Box 550, Rocky Ford

HAWAII
Highway Construction Co.,
720 Umi St., Honolulu 17, Hawaii

NEVADA
Nevada No-Joint Construction Co.
P.O. Box 88, Yuba City

WASHINGTON
Northwest No-Joint Concrete Pipe Co.,
P.O. Box 356, Station A
Palo Alto, California

FOREIGN

AFRICA
The Hume Pipe Co.,
P.O. Box 204,
Germiston, South Africa

AUSTRALIA
E. P. Lough & Co. (Aust.) Pty. Ltd.
26 Ridge St., North Sydney, N.S.W.

CANADA
Keystone Contractors Limited,
P.O. Box 128, Windsor, Ont.

INDIA
Structural Engineering Works, Ltd.,
127 Mahatma Gandhi Rd.,
Fort Bombay 1

SOUTH AMERICA
No-Joint Concrete Pipe De Venezuela, C. A.,
Apartado 10860, Sabana Grande,
Caracas, Venezuela

ASSOCIATED WITH
Morrison-Knudsen Co.,
San Francisco, Los Angeles,
Mexico, D. F.

. . . for more details, write No. 61 on Reader Service Postcard

exploration and production, and others.

More tests were conducted for a year or more, with fleet mileages above a million in many instances. Test mileage on chassis parts was more than 30 million. Wheel bearing mileage was close to 17 million.

In the field tests, superior service characteristics were shown by Darina Grease AX in wheel bearings, shackles, kingpins, steering linkages and other chassis parts. The grease proved appreciably better for wheel bearing lubrication than the greases formerly used by the participating companies. For chassis lubrication, Darina AX performed as well as or better than the greases used previously. Results were specially favorable to the new grease where heavy salting of roads in winter increased the severity of service conditions.

Where participating companies extended their lubrication schedules to take advantage of the properties of the new lube product, satisfactory performance was reported for longer operating periods.

Wet stability, mechanical stability and corrosion protection characteristics of Darina AX proved superior in both field and laboratory tests.

In oscillating friction tests—for service typical of chassis operating conditions—Darina AX served under wet conditions twice as long before failure as other premium multipurpose greases. Under dry conditions, the oscillating friction tests were terminated at 2,000 hours without failure by Darina AX.

. . . Write No. 157

General-purpose electrode cuts spatter loss up to 60%

A general-purpose welding electrode, product of a formulation break-through that cuts spatter loss up to 60%, has been developed by the Welding Products Division of **A. O. Smith Corp.**

Like conventional E 6012 electrodes, more widely used as a class than any others, A. O. Smith's new SW 612 mild steel electrode is a high rutile type for heavy or high-speed production welding where fit-up is poor. Its typical applications include farm equipment, automotive and general construction welding.

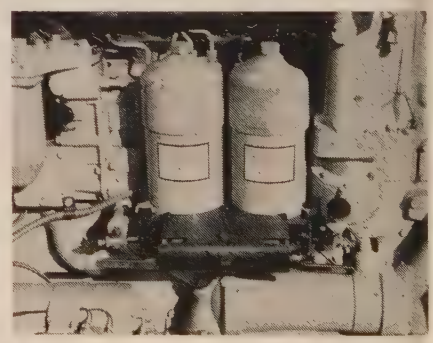
The new rod improves upon other 6012's by cutting spatter loss so drastically that deposition efficiency is up 15% at high currents, improving manipulation to achieve the operator acceptance of an E 6013 class electrode, increasing crack resistance with a high crowned convex head, and reducing slag removal and cleaning time at least 50%. And the 612's attractive bead reduces rejects in applications where appearance is important.

. . . Write No. 158

Bypass valve permits quick oil filter change

An automatic bypass valve that permits oil filter replacement without engine shutdown has been developed by **Peterson Tractor Co.**

Mounted on the filter base, the device is applicable to Caterpillar engines with two filters or more



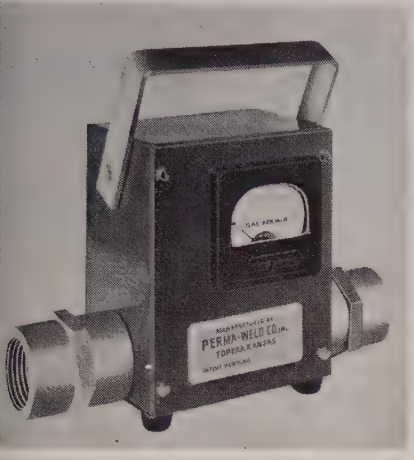
when specifications call for continuous running of the engine. The attachment consists of two levers, one for each filter, and an interlocking safeguard device that automatically prevents oil flow stoppage through both filters at the same time. By placing one lever in an upright position, all oil is force-fed through one filter during the time taken to mount the replacement element in the other filter.

. . . Write No. 159

New instrument measures hydraulic system oil flow

A compact instrument that measures the rate of oil flow in hydraulic systems is now offered by **Perma-Weld Co., Inc.**

Designed for quick connection to the oil line, the Perma-Weld Flow-



meter instantly reports the rate of flow in GPM. There are no switches or adjustments to make, and this Flowmeter requires no timing as do mechanical counters.

It can be used with high pressures up to 1,500 psi., and with any viscosity oil — features impossible with glass instruments.

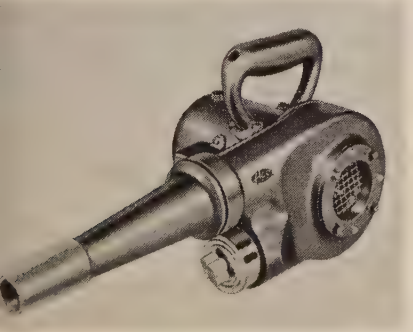
It is made of quality materials, equal to or better than military specifications. It is about the size of a cigar-box, so it can be used in the field as well as in the shop or laboratory. The price of the Perma-Weld Flowmeter is $79.50.

The unit provides immediate visual indication of the pump condition and its degree of wear under all operating conditions, even at working pressures and temperatures. . . . ***Write No. 160***

Portable unit blows hot or cold air

A portable, electric blower that blows air at either room temperature or at 170°F. is being introduced by **Ace-Sycamore, Inc.** It is known as the Ace Model E-1.

This unit can be used in maintenance work, to dry out motors,



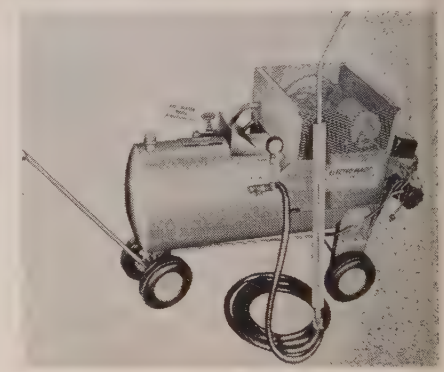
electrical wiring, switchboards, equipment, and other applications where the rapid removal of moisture is desirable.

While the velocity of the air stream is 11,500 feet per minute, the air blown is at low pressure, so it will not harm even delicate equipment.

The Ace "hot and cold" unit cannot be used as a vacuum cleaner. However, it can be used effectively with air sweeping tools and sprayer attachments. Four other Ace Cleaners are designed for all-purpose use including blowing, vacuuming, and spraying. *. . . Write No. 161*

Steam cleaner has rinse attachment

A hot water rinse attachment, formerly available as optional equipment on the Electro-Magic motor steam cleaner, has now been



made standard equipment with no increase in price.

The attachment now allows the operator to rinse or flush by turning a valve.

Coils of the steam cleaner itself can also be cleansed of solvents and other solutions with the new attachment. The attachment can be used wherever city water pressure is available. Electro-Magic models will supply up to 100 pounds of steam pressure in 90 seconds at the touch of the controls.

. . . Write No. 162

Hydraulic press installs bushings

A NEW HYDRAULIC press which removes and installs equalizing-beam center and end bushings on Hendrickson tandems, used on leading makes of heavy-duty trucks, has been announced by Owatonna Tool Co.

The new press consists of a press frame mounted on casters to roll easily on the floor, seven special adapters for removing-installing applications, and a 30-ton capacity

)TC Power-Twin "center hole" hy-raulic ram and pump assembly. The latter is detachable and in-erchangeable with other OTC)roducts such as pullers and shop)resses.

Both center and end bushings an be serviced with the new OTC)ress—the center bushings without even removing the tires or wheels.

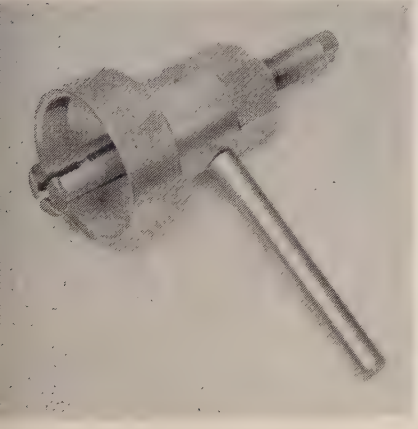
Truck rear cross-member is aised and lowered by means of a ailroad jack or equivalent to per-nit the OTC press to be aligned vith the equalizing-beam bush-ng. Special adapters are then po-itioned for the removing and in-talling applications.

. . . Write No. 163

Pulling tool removes conveyor roll bearings

A special pulling tool, designed o make removal of bearings in con-veyor rolls an easy, fast job, has been announced by the Parts and Service Departments of **Universal Engineering Corp.**

The steps for its use are simple. The roller stub shaft is first re-moved, and the expandable puller bolt, inserted in its place. The ex-panding bolt is then turned in un-til the bolt is holding tight and the pulling lips are seated firmly be-hind the inner ring of bearing bore.

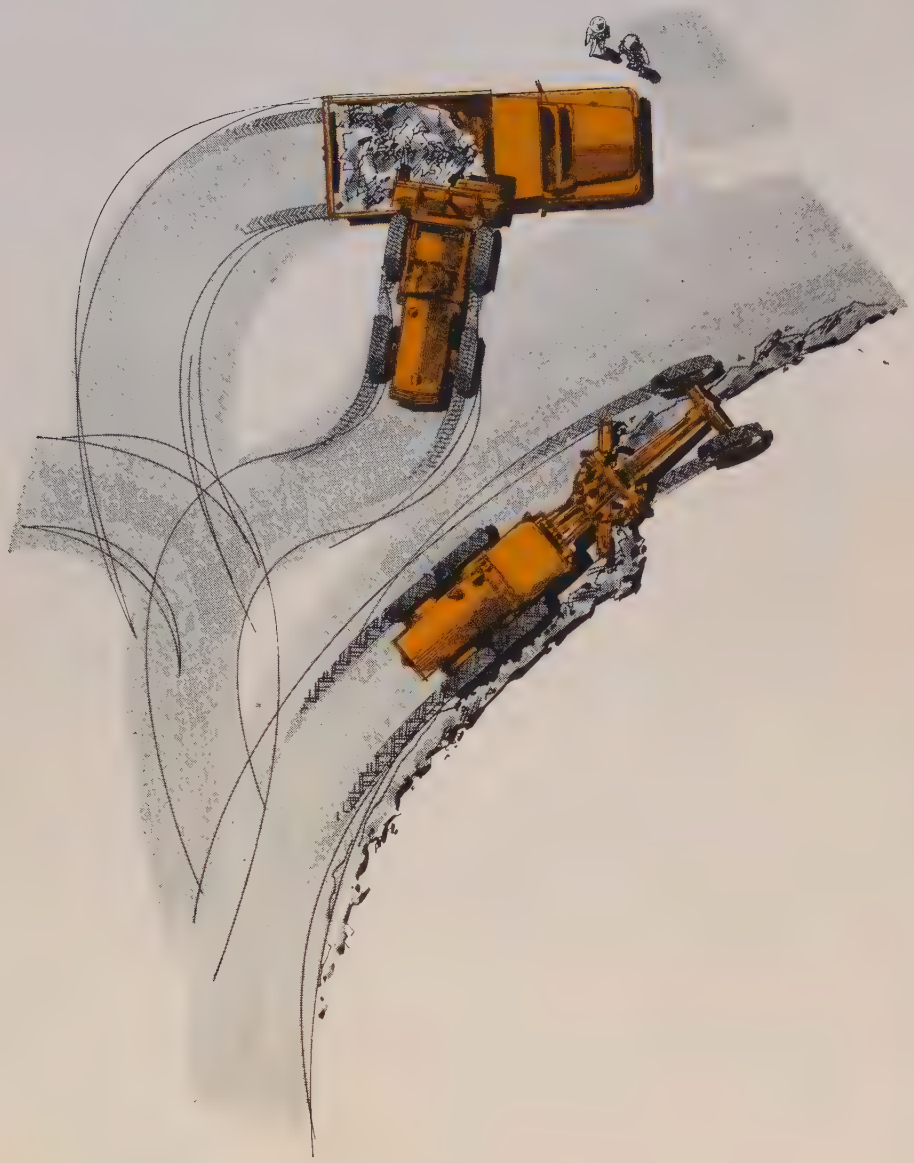


From then on, a few twists on the puller nut pulls the bearing out of its seat in the roller.

A new bearing can then be in-serted into the vacated seat.

The tool was designed to help owners of conveyors reduce their bearing and belt maintenance ex-penses. Often an entire roll would have to be discarded due to one frozen or burned out bearing—or a second good bearing "burned" in order to knock out the failed bear-ing, thus requiring replacement of two bearings unnecessarily.

. . . Write No. 164



CUMMINS C&J DIESELS 70 TO 180 HP

General Building Contractors, County and Municipal Superintendents, Construction and Mining Operators now can have Cummins C&J Diesel *dependability and economy* in a wide variety of medium capacity earthmoving equipment. This means it's easy to standardize on Cummins in graders, front-end loaders, on-highway dump trucks and the many other construction machines requiring from 70 to 180 horsepower.

Fifteen C&J engines are available—nine J models, six C models. This provides a wide range of horsepower in 4 and 6 cylinder block—naturally-aspirated, supercharged and turbocharged designs.

Also, Cummins C&J Construction Diesels have specialized improvements for earthmoving applications. Your engine will be equipped with a composite dry-type air cleaner, special by-pass oil filter, "bottle-stopper" type dipstick and oil filler cap, and, on supercharged and turbocharged models, a special pressurized crankcase. Only Cummins offers all of these features to minimize the entry of dirt into the engine. Positive lubrication and fuel delivery are assured in high angular operations through the use of a multi-lube pump and special oil pan.

Further, C&J engines now come supplied with Cummins new improved PT fuel system. This system, plus Cummins open-combustion chamber design and four-cycle operating principle, enables you to save as much as 25%—30% in fuel costs over engines of other designs.

More than 500 Cummins Service points are located across the United States and Canada where you can always obtain parts and service. As an added benefit, Cummins Distributors also provide job-site help through regular calls of mobile service trucks.

For more information on the efficiency and low-operating cost of Cummins C&J Diesels, see your nearest construction equipment representative or Cummins Distributor.

CUMMINS

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

International Sales & Service • Cummins Diesel International Ltd., Nassau, Bahamas • Cable: Cumnas

Overseas Factory • Cummins Engine Company Ltd., • Shotts, Lanarkshire, Scotland

6-17-60

NEW LITERATURE

To obtain free copies of literature described in this section, write the corresponding numbers on reply postcard.

Combination mixer and paver

Hetherington & Berner Inc. now offer a booklet on their Moto-Paver which also includes brief descriptions of their portable dryer and their motor-loader used in conjunction with the Moto-Paver. Specifications and features of the machinery are discussed amply in this 12-page brochure.

. . . *Write No. 165*

Construction equipment folder

A four-color folder depicting, in brief form, the complete line of **International Harvester Co.'s** construction equipment has been issued by the company's **Construction Equipment Division.** Specifications are given on crawler tractors, Payscrapers, and Paywagon units, Payhaulers, Drott Four-in-One rigs and sidebooms. The 24-page folder is designed for pocket reference and also shows 16 hydraulic and cable dozer and grader blades, 2 tractor-drawn scrapers, 4 cable control units, 5 push plates and 24 diesel and carbureted International engines.

. . . *Write No. 166*

Lightweight concrete

The use of lightweight aggregate concrete in modern construction is the subject of a 20-page publication by **Master Builders Co.** Photographs and job reports present a clear picture of the wide variety of uses for this relatively new and versatile building material. Thirteen construction projects are featured and the use of Pozzolith in providing workability for placement while maintaining strength to meet structural requirements is described.

. . . *Write No. 167*

Turret derrick

Complete information about a Turret Derrick for construction and maintenance is given in a 16-page booklet from **Truck Equipment Co.** Specifications and comparative capacity charts are written out in detail on the truck-mounted derrick that is three tools in one—derrick, digger, and aerial lift. Literature available upon request.

. . . *Write No. 168*

Trailer legal size, weight

A new 70-page booklet authentically describing truck and trailer size and weight restrictions throughout the U. S. and Canada has been prepared by the **FWD Corp.** The booklet, first printed in 1933, now includes Alaska and the Canadian provinces, not previously listed.

. . . *Write No. 169*

Stationary air compressors

A 4-page folder describing its stationary air compressor line—including data on its "Twin-Air" rotary screw-type machines which deliver up to 19,400 cfm. at 100 psi., has been published by **Atlas Copco Pacific.** Copies are available.

. . . *Write No. 170*

Diamond drilling, sawing literature

Literature on diamond drilling machines, diamond drill bits and accessories, Truco concrete, masonry and stone saws and diamond blades is available from **Truco Masonry Drilling Division, Wheel Trueing Tool Co.** Descriptions and specifications are given for a complete line of drilling and sawing tools and hints on how to reduce drilling costs. . . . *Write No. 171*

Construction machinery group

Four pieces of literature covering **Allis-Chalmers** construction machinery are now available from the company's **Construction Machinery Division.** A 20-page catalog reviews the 340 hp., 30 yd. heaped, TS-360 motor scraper. Color illustrations show the scraper in action; specifications are included. A 4-page folder tells the story of the AC D-10 and D-12 utility tractors. It is complete with product feature service, simplicity information, and data on matched equipment available. A 16-page catalog discusses the Model D motor grader. Cutaway views of the grader, illustrations of its gasoline or diesel engine power plant, photos of various components, attachments and accessories are included. An 8-page catalog covers highlights of engineering, design and construction features of the TS-160 motor scraper. Specifications are included. . . . *Write No. 172*

Percussion rock drill

Bulletin 87-J from **Joy Mfg. Co.** describes the Joy 450-DR dual rotation drill. The 4½-in. bore drill uses an integral air motor to provide hammerless rotation for steel changing, and to assist rifle bar rotation in tight formations. The 450-DR has recorded penetration speeds 25% faster in tight formations, and is able to bottom holes where drills without dual rotation get stuck.

. . . *Write No. 173*

Fir plywood catalog for '60

A new, quick reference catalog has been announced for 1960 by the **Douglas Fir Plywood Association,** along with the first two publications dealing with the technical properties of Western softwood plywood sheathing, a new product. The 16-page catalog contains up to date basic information on fir plywood standard grades and specialty products for engineers, builders, product design engineers, and building code officials. The booklets on Western softwood plywood give details on the recommended uses of this product, which has slightly different properties than Douglas fir in structural applications. Sample copies available.

. . . *Write No. 174*

Field erection services

Yuba Consolidated Industries, Inc. has released a two-color, 12-page brochure describing the steel construction and field services offered to industry, engineering and general contractors by several Yuba divisions. Pictured and described are many projects completed by Yuba—bridges, buildings, processing and hydro-electric equipment.

. . . *Write No. 175*

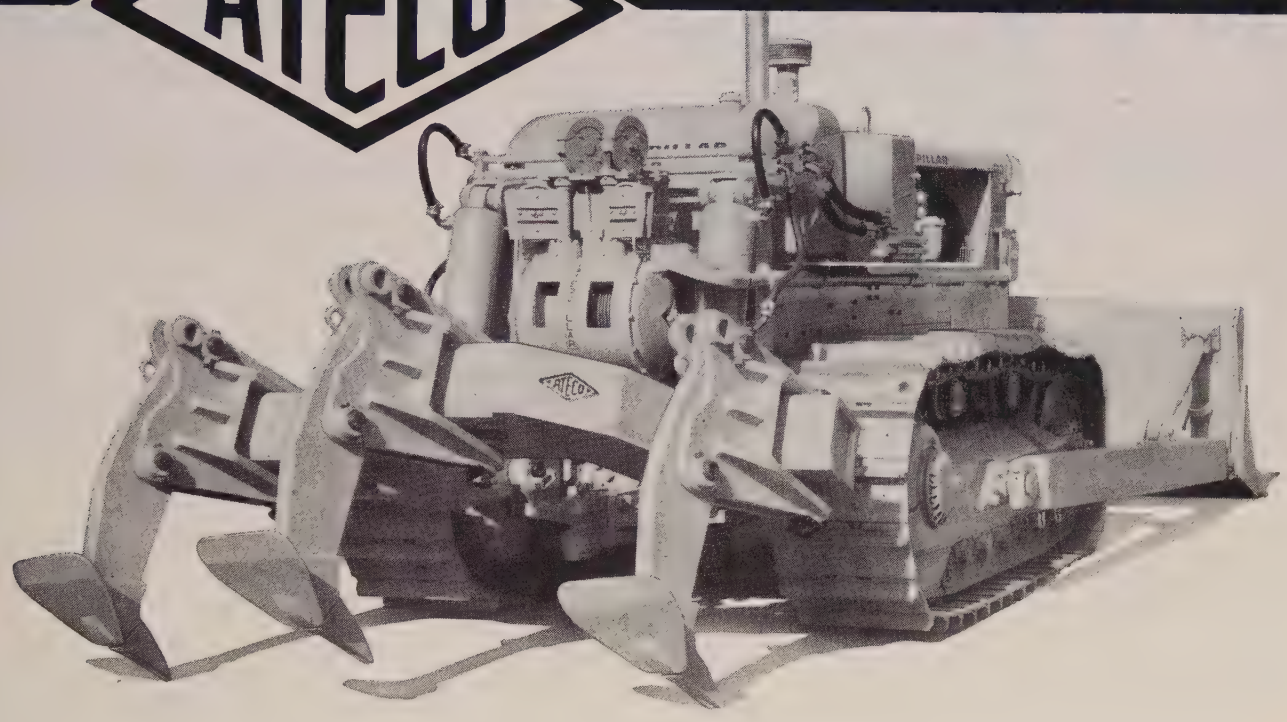
Crawler-mounted machines

A 12-page catalog on the ½-cu. yd. type K crawler-mounted machine is available from **Insley Mfg. Corp.** Catalog No. 160-3 contains upper works, specifications, working ranges and lifting capacities as well as photos illustrating the newly designed wide vision cab. Design details of the upper works and crawlers are illustrated in photographs.

. . . *Write No 176*

EXCLUSIVE* A Tractor-Mounted Ripper That Leaves ROOM FOR A WINCH!

New ATECO HR48 • D8H Rock Ripper



Here's a way to get the absolute **most** out of your D8H... equip it with an ATECO HR48 rock ripper. You'll still have plenty of room for a double-drum PCU winch on the rear to operate a dozer or other cable-operated equipment.

Only ATECO... pioneer in tractor-mounted rippers ...offers this valuable feature plus these performance-boosters:

BEEFED-UP TOOL BEAM of 1½" steel plate all around, 11" x 12⅝" section, box-welded and **internally reinforced** — most rugged D8 tool beam on the market!

EXTRA CLEARANCE to prevent clogging...14" minimum under tool beam when ripping; swing bracket holes moved back to put shank farther behind beam. On offset beam, center shank is 20" back of outside shanks for easier rock breaking and more clearance.

"RUGGEDIZED" THROUGHOUT... 30% larger cylinders with 43% heavier rods; 50% stronger draft arms with no top or bottom welds; extra-thick replaceable wear pads on swing brackets; heavier cylinder support brackets.

ATECO builds the most complete line of job-proved tractor mounted rock rippers in the world. They're available for practically every popular make and model of heavy duty crawler tractor. Why not get the facts? Write today for literature, specifications.

Dept. W7

59

American

ATECO TRACTOR EQUIPMENT

Corporation

Designers and Manufacturers Since 1920

9131 SAN LEANDRO BOULEVARD • OAKLAND 3, CALIFORNIA

... for more details, write No. 67 on Reader Service Postcard

NEW EQUIPMENT

Obtain more information on these new developments in construction equipment by writing the corresponding numbers on reply postcard.

Versatile tool on Case tractor

Adding to the line of **J. I. Case Company** wheeled tractors and equipment is Model W-3. Gasoline powered, it has been designed for use as a 2,500-lb. loader and 3,000-lb. backhoe. Also available is a wide choice of usual accessories which extend to a post-hole digger and a rotary mower. A special feature is an all new 52-hp. high-torque engine providing power at low cost. The torque converter drive is said to produce better performance and greater operating ease than any similar machine in its price range. A lever on the panel permits switching from torque converter to direct drive as required.

The power steering system is hydraulically actuated giving a 90% power assist under full load. The unit is equipped with a standard 15-cu. ft. bucket with other sizes available depending on the material to be handled. To meet trenching requirements, a new heavy-duty backhoe has been provided. This digs to a depth of 14 ft. reaching 20 ft. from the front axle with a swing of a full 180 deg. The backhoe also comes in a variety of sizes.

. . . Write No. 177

New epoxy for patching compound

A patching and floor topping compound called Thiopoxy 60 has been announced by **A. C. Horn Co.** The material is designed to withstand severe corrosive and abrasive conditions that would tend to disintegrate ordinary concrete. It is a one-application compound applied by trowel, cures overnight at normal room temperatures to provide a dense non-shrinking topping with excellent resistance to impact and abrasion.

. . . Write No. 178

Pipe machine on wheeled tractor

Designed especially for contractors engaged in pipe stringing and pipeline construction, **FWD Corp.** announces a wheeled tractor called the Blue Ox-Side Boom. The unit was designed from the ground up which made it possible to lower the center of gravity for greater stability under extreme boom loads. This feature, combined with the hydraulically controlled

counterweight gives it a lifting capacity of 17,500 lb.

For greater traction and control, the unit includes four-wheel drive. The driver sits behind the boom for greater visibility and control. The unit can be moved quickly at speeds up to 47 mph. without a carrier. By the use of an auxiliary gear, the unit has a creep speed of ½ mph.

. . . Write No. 179

L-W beefs up its Model B

With the introduction of a 430-hp., V-12 diesel as standard equipment, **LeTourneau-Westinghouse** has moved its Model B Tournapull into the 29-yd. classification. The company states that it now has about 75 hp. more than the average of other machines in its class, and the best power-to-weight ratio of any single engine scraper.

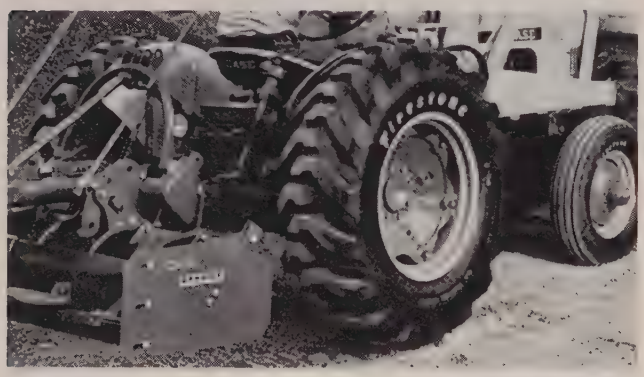
The 28% increase in horsepower accounts for improvement in overall performance. Accelerating time

is cut nearly 1/3 as the machine comes out of the cut, and gets up to haul speed. New larger final drive gears have been added. A new radiator with 50% more cooling surface, a sectional hood which one man can remove and twin dry type air cleaners are now standard equipment. Struck rating of the rig is now about 10% higher and the heaped capacity is listed at 29 yd.

. . . Write No. 180

Firestone tire for today's tractors

Firestone has announced a new tractor tire for both on-and-off the road general purpose tractors. This utility tire is now available as original equipment on all new tractors. By changing the face of its regular agricultural tire tread, research engineers at Firestone designed a tread with shorter, wider traction bars that give 58% more contact area. This provides both needed traction for off-the-road job and doubles the tread life on hard surface roads. For tough industrial work, the tire is made with Firestone Rubber X-tread rubber. With wheel tractors moving into the construction industry, Firestone developed the new tire to meet these demands. *. . . Write No. 181*



Largest portable crushing-screening plant

Designated the largest, portable, duplex crushing and screening plant to be put in full field operation, **Pioneer Engineering** announces its "Pioneer's Productioneer". The unit includes a jaw crusher balanced with a 40-in. diameter and 30-in. wide roll crusher. These crushing units are said to have the greatest actual capacity of any portable unit now available.

The jaw crusher handles boulders up to a 14-in. size. The screening units turn out three sizes of material, using a new design, high speed, 5 x 14-ft. 3-deck vibrating screen. A special design allows for the changing of the product deck without removal of the top deck, and the second deck screen cloth may be removed from either end. For increased ease of travel, the rear assembly, including the bucket wheel and hopper, may be quickly detached without the use of a crane. *. . . Write No. 182*

Transit mixers for short wheel base trucks

Short-base truck mixers which locate the rear load 10 to 28 in. farther forward on the truck frame providing legal loading without frame distortion on short wheelbase trucks are being offered by **The Jaeger Machine Co.** The units which are available in 6, 6½, and 7-yd. capacities achieve their compact mounting by a short, large diameter drum on rollers cantilevered beyond their cradles. This eliminates the bowing and distor-

tion of truck frames experienced where the rear load is located too far back on the truck. The 7-yd. Jaeger unit on a B426 FX Mack truck, as illustrated, has a gvw. of 45,500 lb. Short-base mounting puts 31,500 lb. on rear axles and 14,000 lb. on front. PTO drive, either flywheel or front-of-engine, makes possible minimum spacing between cap and mixer. Air-pressure water tank is operated by the truck's air compressor eliminating need for a water pump.

. . . Write No. 183

New crawler mounted shovel crane

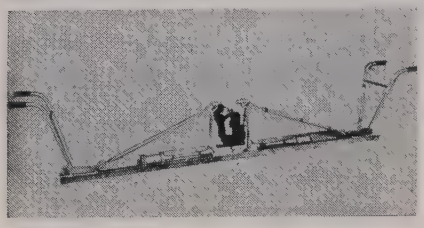
The Unit Model 1220, ¾-yd. shovel, convertible to all standard attachments is announced by **Unit Crane & Shovel Corp.** The model has 50% more braking ability and

redesigned clutches for smoother operation. Engine is mounted in line with machinery and operates through torque converter. The new crawler mounted model has independent boom hoist.

. . . Write No. 184

Vibratory screeds for pours

Portable vibratory screeds designed to handle stiff, harsh concrete mixes are marketed in three widths by **Vibro-Plus Products, Inc.** The units are available in 8, 10, or

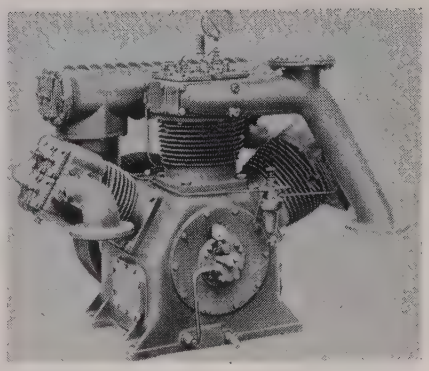


12-ft. widths, and are powered by a gasoline or electric motor. These screeds are recommended for heavy duty industrial floors, bridge slabs, small road jobs, or even precast or prestressed hollow core slabs.

. . . Write No. 185

All purpose air compressor line

A series of piston type air compressors designed for continuous operation is announced by **Atlas Copco.** The new machines designated CR series are 2-stage, single-acting units featuring air-cooled cylinders and cylinder heads. Equipped with water-cooled inter-



coolers, the machines are rated for working pressures up to 125 psi., and deliver from 174 to 338 cfm. The CR-4 has one low and one high-pressure cylinder placed in "V" arrangement. The larger machine CR-6 features two low-pressure cylinders and single high-pressure chamber in "W" layout. Weight of the machines which do not include power plants ranges from 1,500 to 2,000 lb.

. . . Write No. 186

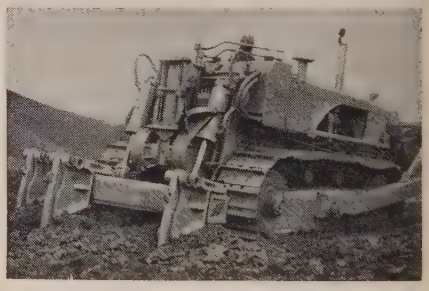
Ribbed conveyor belt for steep slope work

A conveyor belt with diagonal ridges on its top has been developed by **Hewitt-Robbins, Inc.** to carry materials up steep slopes. Called Cleat Top Belt, it can rise as high as 21 deg. without the slip-back encountered with smooth belts. When operated with the "V" shaped ridges pointed in the direction of travel, the belt retains moisture of the material moved. When operated with the open ends of the ridges trailing the direction of travel, water is drained off at the sides. The belt is available in widths of 12 to 30 in., and wider sizes will be produced soon. It will handle wet sand and gravel at an angle of 21 deg., heavy-consistency concrete at 21 deg., soupy concrete at 15 deg., and dry grain at 20 deg.

. . . Write No. 187

Ripper leaves clearance for winch on TD25 crawler

A ripper assembly designed for International TD25 tractors which features an offset tool beam to clear a rear mounted winch is announced by **American Tractor Equipment Corp.** The heavy-duty ATECO unit is designated Model HR48. Unit balances dozer weight for increased traction. It has swivel-mounted shanks for easy steering, even while ripping full depth, and

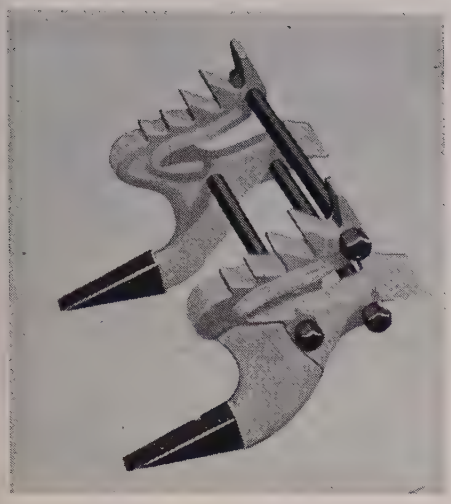


various shanks and points are interchangeable. Maximum ripping depth is 48 in. with standard shank. Greater tool beam lift has been provided to give ample clearance for pipeline and cable-laying shanks. Hydraulic cylinders have 8⅛-in. bore with 3-in. rods. Extra-heavy tool beam is of 1½-in. steel plate construction 11 x 12⅝ in. in cross section. ATECO rippers also are available for International TD14, TD18, TD15, TD20, and Drott skid shovel combinations.

. . . Write No. 188

Ripper teeth for scrapers fit without fasteners

Twin shank ripper units which attach to the lip of a scraper and are held in place by the apron have been developed by **Hensley Equipment Co., Inc.** Each shank has an offset V-slot at the top which fits



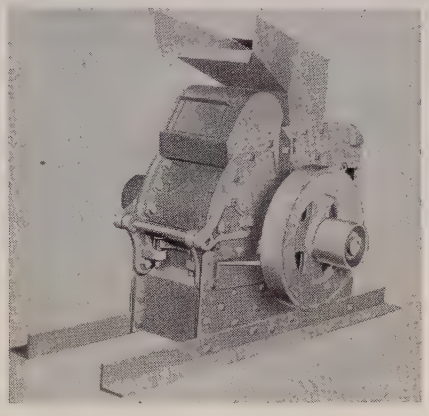
over the scraper lip and a series of notches along the top edge into which the apron edge fits to hold the unit in place. Rippers are recommended for blacktop removal as well as ripping in rock shale or hardpan. Each of the double units is assembled with 15-in. spacer bars and normally 3 such units are attached to the scraper. Holding notches provide positive depth control. Units can be installed in 5 minutes without fasteners or welding.

. . . Write No. 189

All purpose hammer mill for aggregate crushing

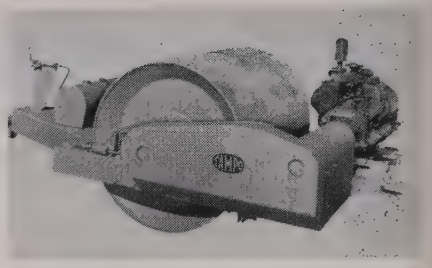
An all purpose pulverizer which produces particles from dust to 2-in. size is announced by **Iowa Manufacturing Co.** The Cedarapids Model 20 hammer crusher is particularly recommended for use as a pulverizer for burnt lime, gypsum, limestone, oyster shell, salt, chalk, and most hard, dry, non-oily, non-fiberous materials. The inexpensive machine is constructed with steel plate, and lined with abrasion-resistant steel throughout the interior. Cross-bar hammers and breaker plates are also abrasion-resistant to assure long life and low maintenance. The unit is equipped with self aligning, anti-friction bearings, a flat faced pulley, spacers, grate bars, and a heavy-duty flywheel. Three free-swinging hammers are mounted on a balanced rotor. Interior is readily accessible by swinging the hinged top section down. Individual breaker plates are interchangeable and reversible. Sizing of material is controlled by grate bar spacing.

. . . Write No. 190



Roller vibrates at frequency of soil

A steel roller with fully variable vibration frequency range which can be controlled to vibrate at the natural frequency of a soil mass to obtain greater compaction efficiency is announced by **Tampo Manufacturing Co.** The Model VC80 is a steel roll unit with 60-in. tread and 7,000-lb. gross weight, designed for towing by a prime mover. Vibratory unit is powered by a 36-hp. gasoline engine. It delivers up to 80 tons of compacting power. The Tampo Vibra-Meter is furnished as



standard equipment providing a visible means of determining compaction effect. Roller has a balanced frame, a micro setting throttle to provide precise settings, and an integral unit vibrating mechanism lubricated by pressure fittings. Literature available.

. . . Write No. 191

3-piece telescoping boom for hydraulic truck crane

A high lift hydraulically-telescoped boom with a maximum reach of 35 ft. is now available as standard equipment on the **Bucyrus-Erie Co.'s** Model H-3 Hydrocrane, a truck-mounted, all-hydraulic crane-excavator. The three-piece boom is fabricated of alloy steel for greater strength with less weight. The tip section features a gooseneck boom point. Telescoping intermediate section is hydraulically extended or retracted. It can be "inched" as much as 9 ft. 4 in. by means of a single-acting telescopic ram. Both sections roll on aluminum rollers mounted on dust-tight

anti-friction bearings. For extra high crane work, the 35-ft. boom has 10 or 20-ft. jibs available. A simple pin arrangement for locking the tip section in position permits long or short setups in a matter of minutes. For work inside buildings or extremely cramped quarters, upper and intermediate sections telescope into the lower section to form a working boom only 15 ft. 9 in. long. The Hydrocrane unit for which the boom is made is completely hydraulically powered and controlled. Its features include short tail swing, independent boom

A welder caused us to caucus

The note from an employee suggestion box read "How come a company like this hasn't got the U. S. Savings Bond Payroll Savings Plan". It was signed by a welder in the fabricating department.

Since we actually *do* have Payroll Savings this told us two things: (1) Probably more employees than we imagined wanted the advantage of buying U. S. Bonds automatically through Payroll Savings. (2) We had grown lax in bringing our Plan to their attention.

But what to do? The solution was simplicity itself.

We called in our State Savings Bonds Director. He provided all the promotional materials needed to arouse interest in U. S. Savings Bonds. Then he helped to conduct a personal canvass and place an application blank in everyone's hands.

The results were amazing. Employee participation shot up to a percentage that we could take pride in. There was no "hard selling", nor was work interrupted. Our people wanted the security U. S. Savings Bonds offer them.

Today there are more Payroll savers than ever before in peacetime. Your State Director will be happy to help you install a Payroll Savings Plan or build enrollment in one already existing. Look him up in the phone book or write: Savings Bonds Division, U. S. Treasury Dept., Washington, D. C.

WESTERN CONSTRUCTION

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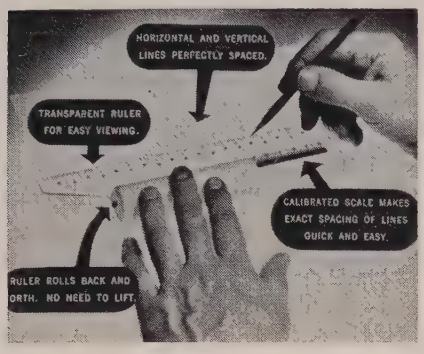
hoist, four quick-setting hydraulic outriggers, deadman safety control, and quick convertibility to a variety of front-end attachments.

. . . Write No. 192

Roller-ruler for drawing parallel lines

A transparent ruler with its back edge mounted on a wide roller has been developed by **Calmart International** as an aid to produce parallel lines, cross hatchings, and other drafting operations. The unit in-

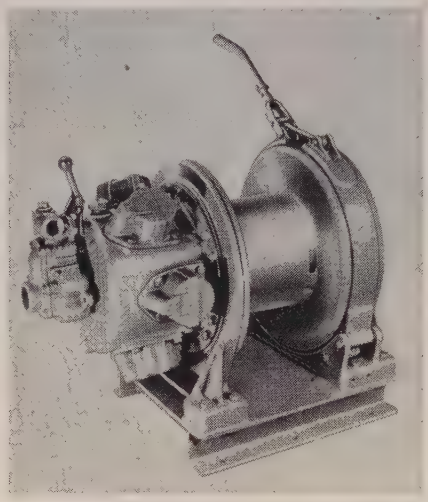


cludes a calibrated scale for figuring line spacing. It can be used as a compass by inserting one pencil in a hole at the end of the ruler and another in one of the series of holes spaced at half inch intervals along the ruler and moving the second pencil to make an arc for circle.

. . . Write No. 193

Air operated utility hoists

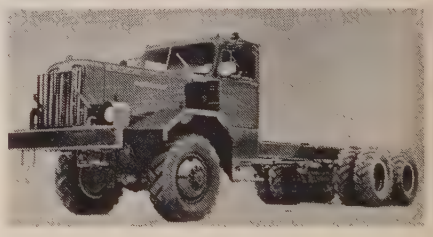
Two air motor single drum hoists of 7,000 and 5,000-lb. capacity have been developed by **Ingersoll-Rand.** Called K6U and K6UA, they have greater capacity than any other single-drum air hoist, but retain the same portability and adaptability of smaller units. Both are equipped with reversible six cylinder air motors with infinite speed graduation provided by the throttles. A self-energizing brake supplements the reversible motor for positive control. At 80-psi. air pressure, the K6U has a capacity of 7,000 lb. with an average lift speed of 65 ft. per minute. The K6UA is rated at 5,000 lb. at 95 fpm. Drum capacity of the two units is 600 ft. of ⅝-in. wire rope or 400 ft. of ¾-in. wire rope. Optional remote controls are available.



. . . Write No. 194

Truck line features all-wheel-drive

A wide range of all-wheel-drive vehicles including both four and six-wheel-drive lines is announced by **Autocar Division of The White Motor Co.** Newest in the line is a six-wheel-drive, 45,000-lb. GVW chassis, model C5566. Designed for maximum traction under full-load operations, it is presently shown mounting a 6½-cu. yd. mixer. Features in the model include an 11,000-lb. capacity front driving/steering axle, 170-hp. gasoline engine, 5-speed transmission, 2-speed transfer case with ratios of 1:00 to 1 and 2.48 to 1, and 34,000 lb. capacity

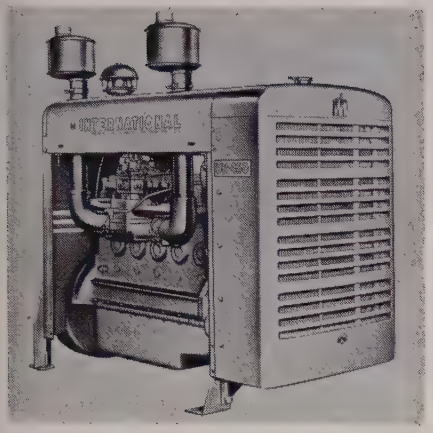


double reduction tandem rear axle equipped with inter-axle differential and power operated lockout. Drive for the mixer is provided by a highly-simplified belt-drive flywheel power takeoff recently added to the Autocar line. Gear drive flywheel PTO also is available. Other all-wheel-drive models include on-and-off-highway trucks, either 4x4 or 6x6, ranging from 32,000 to 90,000 lb. GVW. Similar units are available as tractors for on-highway or carry-all operations. Both gasoline and diesel engines are available.

. . . Write No. 195

IH engine series has higher horsepower

Three new 6-cylinder carbureted engines with higher horsepower ratings than current models of the same displacement have been intro-



duced by **International Harvester.** The new models are the UR-372, UR-450, and UR-501 engines. Their respective horsepower ratings are 165, 182, and 212. Among the features are full-flow oil filter, long life ignition and new high-capacity water pump. The engines have updraft carbureton with velocity governor. All models are available with natural gas and LPG attachments. The three engines available with distributor or horizontal magneto ignition are well suited for use with shovels, cranes, generators and for oil field applications.

. . . Write No. 196

Fully convertible crane-excavator

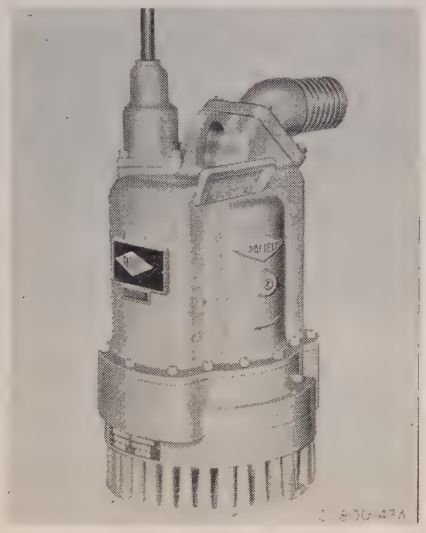
A crane excavator rated at 9 tons as a crane, 5/8 cu. yd. as a shovel, and 3/4 cu. yd. as a dragline is offered by **Bucyrus-Erie Co.** Booms from 25 to 80 ft. and boom-jib combinations up to 85 ft. are available. Crawler mountings feature a choice of tread widths from 16 to 24 in., reversible treads with patented stabilizing lugs, and a single flame-hardened roller path for lateral flexibility. Of particular note for

heavy duty excavation or crane work, the crawlers can be augmented by a new optional stability feature—four screw-type jack outriggers which provide "square crawler" working advantages, boost standard capacities 15%. Other features: color coded lubrication fittings, reversible clutch bands, independent boom hoist, high altitude engines, choice of power.

. . . Write No. 197

Submersible sump pump

A submersible sump pump which is always primed and has no suction hose is available from **Pacific Pumping Co.** To operate, just lower into the water, plug in the cables, attach the hose, and turn the start knob. It will pump whatever water comes in, even it it is only 5% of



the pump's capacity. It operates in muddy water or sludge, under flood or semi-dry conditions, in hot or freezing climate. Discharge passes alongside motor, cooling the epoxy-covered windings. Ball bearings are lifetime lubricated. Pressurized double seal runs in oil, protecting it from grit and abrasion. Lightweight alloy casting resists action of salt water, and erosive or contaminated water. *. . . Write No. 198*

Three Caterpillar motor graders

Three models of motor graders, No. 112E, 112F and 12E, all with greater productivity, have been announced by **Caterpillar Tractor Co.** The 112F is powered by a turbocharged four cylinder diesel engine rated at 100 hp. Horsepower of the 112 Series E has been increased to 85—13% over the previous model —and the 12E is rated at 115 hp. Both the 112E and 112F have the Caterpillar oil clutch, improved blade controls, one-piece transmis-

sion and finel drive case, and the recently developed dry-type air cleaner. In all three engines the air intake manifold is cast integrally with the cylinder head, reducing the possibility of dirt entry. The 112E and 112F are the only graders in their size class with oil clutches, which require only minor adjustments all season. Side slope workability of the No. 12E has been improved by lowering the center of gravity. Adjustment of the side shift rack is now possible through a split arrangement. The rack is installed with shims which can be removed to compensate for wear. Illustrated is the 112.

. . . Write No. 199

Asphalt plant exhaust washer

Removal of dust caused by aggregate drying is easy with an exhaust washer now manufactured by **Iowa Manufacturing Co.** Available in sizes from 15,000 cfm. to 45,000 cfm., the washer reduces the dust nuisance for personnel, helps protect moving parts, cuts main-

tenance due to fine dust and filtration, and allows the contractor to comply with municipal and county regulations on air pollution. It does not require auxiliary fans to provide draft, there are no filters, louvers or vanes to clog, wear and replace, no special housing or installation needed, and no extensive ductwork. The washer connects directly to the dry dust collector.

. . . Write No. 200

"Snap on" a backhoe

Only one minute is needed to "snap on" a new backhoe to a model 55A, 75A, and 85A Michigan tractor shovel. The new fully hydraulic backhoe attachment, made by Badger Division of Warner and Swasey Co., has 180-deg. continuous swing, and 180-deg. bucket tilt. The unit features a 12-ft., 4 in. dig-

ging depth, 10,000-lb. breakaway at the bucket teeth, and 15-ft., 6 in. reach from center rotation. A counterbalance is included for use when the hoe is disconnected. Although made for Michigan tractor shovels, they will take a variety of buckets, which attach in half a minute. For more data write **Clark Equipment Co.,** Pipestone Road, Benton Harbor, Mich.

. . . Write No. 201

BRIDGES

(Continued from page 65)

pants with a hunting-shirt and field boots. He rolls his own cigarettes, a hangover from the Marine Corps, and does business on the remodelled front porch of the cottage office building at the county yard. He uses dime store reading glasses, and thoughtfully bought a couple extra pair which he leaves around the office for anyone else whose arms are getting too short. The road commissioner's sideline activities include a dubious business venture called the Wild Ass Mining Company, composed of a group of camping cronies in Hollister. Organized during a camping trip and named for the wild burros who roam the area, the mining company actually staked a chrome ore claim at a camp site, and later sold it. The money was used to finance subsequent camping trips, but this was incidental to the main operation of opening a bank account in the firm name and distributing business cards to the members.

A few years ago Hanna and his buddies in the Wild Ass Mining Company set up an Outer Space

Division and staged a gigantic rocket launching at the nearby hamlet of Tres Pinos.

Hanna is currently interested in the mythical Tres Pinos Overhead Sewer Company and its plans to propel sewage through overhead pipes utilizing its own methane gas.

Hanna's engineering department also handles details of the overhead sewer project. That is, when he has an engineering staff. His force was recently "wiped out" and he is currently advertising for a replacement.

The replacement, when he arrives will bring the road department to a full strength of 27 men. This includes a 5-man engineering and administrative group which covers such duties as building inspector, oil and gas well inspector, right-of-way agent, bookkeeper for the county hospital, road superintendent, and engineer. In addition, there are five combination grader operators and district foremen, 8 truck drivers, one mechanic, one mechanic welder, 4 laborers and one gang foreman.

The county equipment fleet includes:

5 motor graders
1 D7 and 1 D6 Caterpillar crawler
1 Kolman portable screening plant with a 30 in. belt
4 8-yd. dump trucks
4 4-yd. dump trucks
1 GMC 1,330 gal. water truck
1 Athey windrow loader
2 Wagner bucket-loaders of 2½, 1½, and ¾ yd. capacity
2 ¾ yd. Hough Payloaders
1 double drum tandem roller
1 Tampo rubber-tired roller
1 Austin-Western tandem 8-ton roller
1 Model 19 International Harvester wheel tractor
1 portable water pump
1 Jaeger 125 compressor
1 Quickway Model E truck crane on a 1921 White truck (repowered)
1 1911 White Station Wagon

This last item is not in general circulation, but it is kept for use on special occasions. The hard tired runabout has been restored to top condition. It has a rear entrance, surrey top, and two seats running lengthwise in the back. It was bought new by the county which Hanna says never throws anything away and ultimately is destined for a museum of some kind at the San Juan Baustista Mission where it will be on display along with some other ancient pieces of equipment.

Hanna also has a 1930 Ford Model A sedan, proudly bearing the San Benito County decals with the notation, "For official use only." The car actually belongs to his daughter, but is used occasionally to transport visiting dignitaries around the mountain domain. When nobody is looking, Hanna drives a modern station wagon equipped with two-way radio, as there are 7 other county vehicles.

His station wagon also has a siren and red lights which the road commissioner has never used. He prefers to leave his mark on the county in other more subtle ways. These include his collection of handsome bridges, fashioned of junk iron, hatch covers, and whatever surplus material he can find, and the official county road map on which, if you have a pair of dime store reading glasses, you will find in the remote southeastern corner a highway, clearly labelled, "Wild Ass Road."

Tudor Company to design foreign bridge foundation

THE consulting firm of Tudor Engineering Co. of San Francisco will carry out the design for the piers of the Tagus River Bridge near Lisbon, Portugal. The structure will be the largest suspension bridge in Europe and foundations will be built by Morrison-Knudsen.

News of DISTRIBUTORS

AMONG the 400 persons attending a 3-day meeting in Columbus, Ohio, of distributors representing the Huber-Warco Co. were many from this Western region. A few of them appear above. Left to right: Seated—*J. P. Costello,* distributor from Calgary, Can.; *Roy M. Carr* of Faris-Moritz Equipment Co., Denver, Colo.; *Fred Evans* of Archer Tractor & Machinery Co., Salt Lake City, Utah; *Noel Caldwell* of Caldwell Machinery Co., Seattle, Wash.; *Joe Miller,* National Machinery Co., Ltd., Vancouver, B. C. Standing—*Joe Whelan* of Marion, Ohio, H-W divisional sales manager; *C. B. Payne* of Archer Tractor & Machinery Co., Salt Lake City; *Ray Duerden* of Feenaughty Machinery Co., San Francisco, Calif., and *Jack McCaffrey,* H-W Western district manager. Headquarters of Huber-Warco, manufacturer of motor graders, road rollers and maintainers, are in Marion, Ohio.

Manitou expands quarters, personnel and accounts

Manitou Equipment Co., now located in its new quarters at 3445 N. W. Front Ave. in Portland, announces the addition of Dwight E. Rosengrant to its sales force in the state of Washington, as well as the acquisition of the account of Bay City Shovels, Inc. for Oregon and the western section of Washington.

IH appoints Arnold Machinery for Intermountain area

Arnold Machinery Co., Salt Lake City, Utah, has been appointed Intermountain distributor for International Harvester Construction Equipment in Idaho and Utah. Territories served include Utah, eastern Nevada, and all of southern Idaho. Arnold Machinery Co., one of the oldest construction equipment distributors in Utah, is headed by Raymond L. Arnold, president. Vice presidents are A. D. Byerline and Joseph W. Plant; Robert G. Arnold is treasurer, and R. L. Pond is secretary of the company.

Cochran represents West at White's Distributor Council

R. W. Cochran, president of The Truck Equipment Co. of Arizona, attended The White Motor Co.'s annual Distributor Council at Cleveland recently. Cochran, who is distributor of White, Autocar and White-Freightliner trucks for all of Arizona, is chairman of the Pacific Coast Regional distributor council representing the eleven Western mainland states, Hawaii and Alaska.

GM Diesel sales handled by new Salt Lake distributor

Abbott-Glass GM Diesel, Inc. of Salt Lake City, has been appointed distributor for GM Diesel engines manufactured by the Detroit Diesel Engine Division of General Motors. The newly established company, located at 56 W. Seventh South, Salt Lake City, will handle sales, service and parts in all of Utah and several bordering counties in Nevada, Oregon, Idaho and Wyoming. A branch has also been established at 900 E. Park Blvd. in Boise, Idaho.

Ka-Mo line distributed by Star

Star Machinery Co., Seattle, has been named distributor for Ka-Mo trademark products by Kwik-Mix Co., Port Washington, Wis., a division of Koehring Company. Territory assigned the newly appointed distributor includes 26 counties in western Washington. Star's president is I. B. Rabel, while the general sales manager is Robert J. Norwalk.

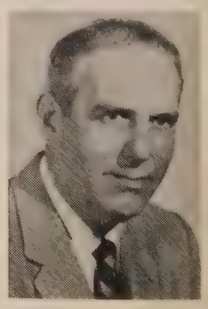
Personnel changes by Arizona firms

Len W. Beck, Sr., president of Min-A-Con Equipment Co. and The Diesel Service Co., Phoenix, announces two changes in both firms. Ray E. Early, Phoenix, has been promoted to sales manager of The Diesel Service Co. He has been connected with the heavy construction equipment field since 1940. Thomas I. Melton, Sedona, was named advertising manager of both Min-A-Con firm and Diesel Service Co.

New appointments by Arizona Caterpillar dealer

Several recent appointments are announced by Empire Machinery Co., Phoenix. Keith B. Rousseau has been named credit manager, according to Jack Whiteman, president of the Arizona Caterpillar dealership. Joining the sales staff, under Sales Manager "Dutch" Strahm, is Hoyt E. Kirby. The new

Rousseau

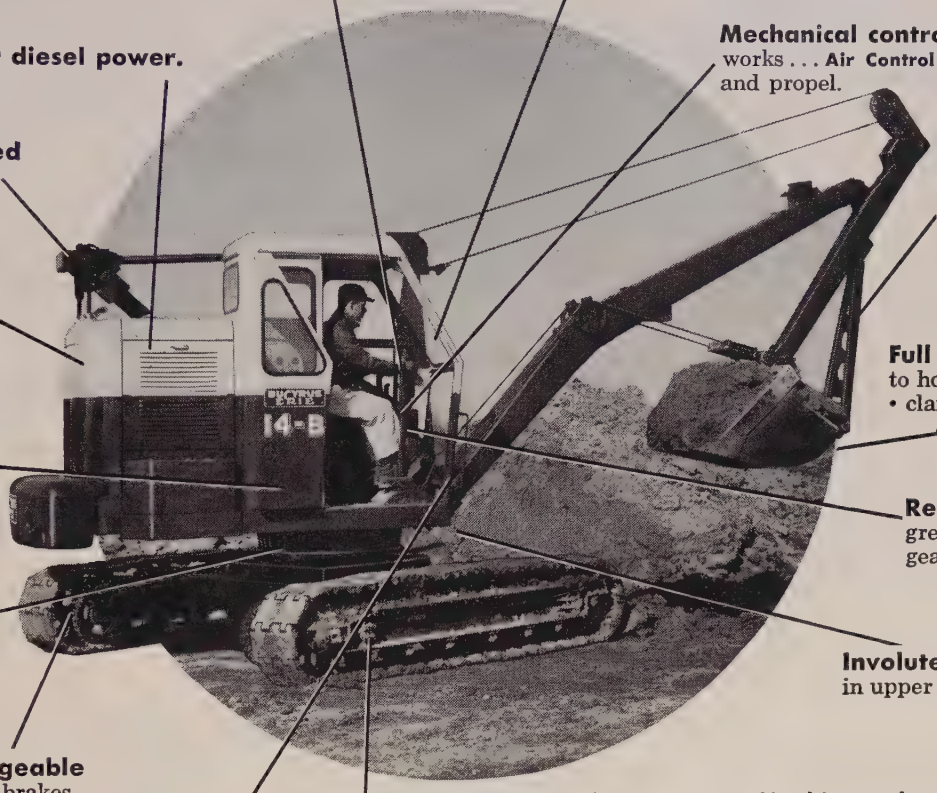


Kirby

Neilson

Turner

...in everyone's price range!



Air-powered Quick Shift, swing to propel on crawlers.

Full-visibility cab that lets you see in all directions.

Choice of gas or diesel power.

Mechanical controls for the upper works . . . **Air Control** for steering and propel.

Direct drive, 3-speed transmission or torque converter drive.

Handles ½ and ⅝-yard dragline and hoe buckets to suit job conditions.

Full-paneled cab for easy access all around.

Full convertibility to hoe • crane • dragline • clamshell • shovel.

Enclosed gears on main machinery, running in oil.

Remote lubrication grease gun for swing gear and pinion.

Ball bearing swing circle adjusted for life at the factory.

Involute splined shafts in upper works and crawlers.

Identical, interchangeable operating clutches and brakes on main shafts.

Color code lube guide.

Crawler outriggers to boost standard crawler capacities by 15%.

Crawler or Transit Machine, take your choice and get the best buy on the market for *work* capacity and *lift* capacity and *profit* capacity in a price range that's the best news of all!

most respected name in the industry...

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CROOK COMPANY
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THEO. H. DAVIES AND CO., LTD.
Honolulu & Hilo, Hawaii

ROAD MACHINERY COMPANY
Phoenix & Tucson, Arizona

SANFORD TRACTOR & EQUIP. CO.
Reno, Nevada

WEST COAST ENGINE & EQUIPMENT COMPANY
Berkeley & San Jose, California

CATE EQUIPMENT COMPANY
1132 South 4th West, Salt Lake City, Utah

Robert Pierce

ified for his new post, having been associated with contractors, manufacturers and equipment suppliers in the heavy construction industry for more than twenty years. Cook Bros. Truck & Equipment Co. is the Northern California distributor of Challenge Pacemaker truck mixers and Cook heavy-duty trucks and trailers, in addition to a full line of contractors' equipment.

Curtiss-Wright construction machinery distribution in Alaska

Another new distributor in the West for the South Bend Division of Curtiss-Wright Corp. is Northern Supply, Inc. of Anchorage, Alaska.

John McMahan takes on Daybrook hoists and gates

John McMahan Co., Inc., Portland, Ore., was recently appointed sales and service representative for Daybrook telescopic and underbody hydraulic hoists and Power Gates, according to announcement by C. A. Watson, general sales manager, Daybrook Hydraulic Division, Young Spring & Wire Corp., Bowling Green, Ohio. Territory covered by McMahan includes five counties in Washington, and all of Oregon except Baker, Harney and Malheur counties.

New outlets for earth-moving equipment

Appointment of two regional distributorships for mobile earth-moving equipment manufactured by Quick-Way Truck Shovel Co. is announced by Paul J. Wolfert, director of sales. Casey-Metcalf Machinery Co., Los Angeles, was named distributor for seven Southern California counties, plus Clark County in Nevada. Smith Booth Usher Co., San Diego, was named distributor for two Southern California counties: San Diego and Imperial.

Franchise granted Cal-Ore by Chicago Pneumatic Tool Co.

In addition to the Northwest Engineering Co. franchise for the state of Oregon, Cal-Ore Machinery Co., Inc., has been granted the Chicago Pneumatic Tool Co. franchise for all of Oregon state and five bordering southern Washington counties. Cal-Ore already has the Oregon franchise for Browning

Portland Profits By Resurfacing Streets With CATIONIC BITUMULS

Distributor applies Cationic Bitumuls at 0.25 gal./sq. yd.

The City of Portland, Oregon, has just completed its second successful season of Single Surface Treating city streets using Cationic Bitumuls.

Two years ago, Cationic Bitumuls was used on more than 80% of a total of over one million square yards of Sealing. Costs averaged out at about 12 cents per sq. yd. as opposed to 16½ cents for similar work using an asphalt cutback. Last year's program covered 800,000 sq. yds. Conservatively, this means a saving of over **$70,000 in two years!**

Portland officials trace the savings to the following factors: less aggregate required; smaller crew; less binder; faster operation.

Investigate the benefits of using Cationic Bitumuls for Surface Treating **your** roads and streets. Your community, too, can **profit** just as Portland is doing. Call our nearest office for full information.

Manufacturing Co. The territory is served by the firm's Southern Division in Medford and its Northern Division in Portland.

Personnel changes by Central Machinery

Walter Rust has left Central Machinery Co. as branch manager of the Havre, Mont., store to take over the Ford agency at Chester. Bill Bronson, parts manager, succeeds him at Havre. Darrell Dahl is Bronson's replacement in the parts department. Resident representative in Shelby is Millard Trask. Assigned as promotion manager is Ed Clarke, formerly in industrial sales.

President Henry Sheffels and General Manager Ed Reed are now occupying their new offices at headquarters in Great Falls. In the new conference room for parts service and sales meetings, facilities have been installed for the showing of motion pictures to customer and company personnel.

MANUFACTURERS

Bay State Abrasive buys West Coast diamond blade firm

Bay State Abrasive Products Co., Westboro, Mass., has purchased the Felker Manufacturing Co. of Torrance, Calif., to be operated as a wholly-owned subsidiary under the direction of Vice President Elden L. Auker. Lester F. Kuzmick will be retained as manufacturing manager, and Fred K. Ryan as sales manager. Felker is a well known manufacturer of diamond abrasive cut-off blades used in the construction and other industries.

Allis-Chalmers building multi-million dollar plant

Allis - Chalmers Manufacturing Co. broke ground recently for a new multi-million dollar engine manufacturing plant at its Harvey, Ill., Works. The new facility will be a 1,100 x 440-ft., 1-story steel beam construction, providing 515,000 sq. ft. of floor area. Completion date is set for mid-1961.

Yuba-Southwest broadening production

Yuba Consolidated Industries, Inc., will soon begin manufacturing its Southwest line of compaction equipment at plants in Bedford, Ind., and Houston, Texas. These two locations will also serve as distribution points for the equipment. Until now, production of the Yuba-Southwest line of compactors and sprinkler tanks was concentrated at Yuba's Alhambra plant in California.

Dale Johnson assigned to Western construction sales

Dale C. Johnson of Hercules Powder Co.'s explosives department has been appointed special sales representative assigned to construction sales. He will call on the heavy construction trade in the eleven Western states. Johnson has been serving as a sales-service man in the San Francisco district for the past several years.

Calaveras Cement opens Oregon plant

A new bulk cement transfer plant has been opened in Springfield, Ore., by Calaveras Cement Co., a division of The Flintkote Company. Charles Evans, Jr., formerly of San Andreas, Calif., has been appointed plant manager. Modern throughout, the plant will serve as a distributing point for truck delivery in the thirteen southern counties of Oregon.

Alcoa transfers Paul Yeaton

The transfer of Paul E. Yeaton to Aluminum Co. of America's Portland branch sales office as a sales engineer is announced by L. F. Lafferty, manager. Yeaton comes to Oregon from the company's Edgewater, N. J., works.

Motorola promotes Gordon Mead

Gordon Mead has been named manager of the account executive program in the West for Motorola Communications & Electronics, Inc. As an account executive Mead has served the states of California, Nevada and Utah, and now from his headquarters in Sacramento, Calif., he will direct Motorola account executives in ten Western states.

New sales manager for Oakland firm

Henry N. Bacon has been appointed sales manager of Taylor Roof Structures of Oakland, Calif., one of the Bay area's oldest fabricators of wood roof structures.

Top level appointments

Announcement is made by American Cement Corp. that Garner A. Beckett has been elected honorary chairman of the board of directors, and Allen L. Chickering, Jr., succeeds him as chairman of the board. At the same time the corporation announced that James P. Giles, Jr., president of Hercules Cement Co., a division of American, has been elected executive vice president of American.

McCallar becomes general manager at Pacific Corrugated

Appointed general manager of Pacific Corrugated Culvert Co. of Northern California is Herschel S. McCallar. Assistant general manager and sales manager of the Sacramento based operations for the past five years, McCallar replaces J. F. Halladay who resigned. McCallar joined Pacific Corrugated at its Irwindale, Calif., headquarters in 1953.

New Blaw-Knox engineering head

Appointment of a new manager of the engineering department of Blaw-Knox Co.'s Construction Equipment Division is announced. He is Robert W. Thornburg, who for the past thirteen years was a chief engineer and works manager for Blaw-Knox in Minneapolis. His new headquarters are in Mattoon, Ill., where the company's construction equipment production facilities are located.

Kaiser Steel opens in Utah

Kaiser Steel Corp. has opened a sales office in Salt Lake City at 405 S. Main St. David B. Brunson has been transferred from the home office in Oakland, Calif., to serve as sales representative for the new facility which will provide service to customers in the great Salt Lake areas as well as throughout Utah and southern Idaho.

New Rotadrill sales manager

Announcement is made of the appointment of John R. Mills as sales manager of the Rotadrill Division of Schramm, Inc., West Chester, Pa., manufacturer of air compressors and air drilling equipment. Mills comes to Schramm with more than ten years' experience in many phases of water well and blast hole drilling.

New board chairman and president

Raymond International, Inc., New York City, announces the election of George F. Ferris as chairman of the board of directors, and Henry C. Boschen as president. Ferris succeeds Maxwell M. Upson who becomes honorary board chairman. Raymond International is the nation's largest constructor of foundations for heavy engineering structures and a leading overseas contractor.

Barber-Greene—Telsmith merger

Shareholders of Barber-Greene Co. and Smith Engineering Works of Milwaukee, Wis., voted a merger by which the Smith firm becomes a division of Barber-Greene. This adds to the Barber-Greene line of asphalt mixing and paving equipment, and conveyors and other construction equipment, the well known Telsmith line of crushing and screening and other construction equipment. The product lines of the two companies are natural complements to each other.

Le Roi names special representative

The appointment of Gary R. Radcliffe as a special representative has been announced by Le Roi Division, Westinghouse Air Brake Co., Milwaukee, Wis. Radcliffe has been assigned to the Le Roi Western region, comprising Arizona, California, Nevada, Oregon, Washington and north Idaho. He will headquarter in San Francisco.

Crump elected v.p. of C.I.T. Corp.

Charles J. Crump, Jr., has been elected vice president in charge of credit and operations for C.I.T. Corporation, as announced by Thomas E. Lenihan, president.

C.I.T. Corporation is the nation's largest industrial financing company and a subsidiary of C.I.T. Financial Corporation. Crump succeeds George E. Lagergren, who is retiring after 36 years of service with the company. Crump was head of operations for the San Francisco division before transferring to the home office in New York in 1952.

Executive appointment by Pacific

Kellogg Spear, president and general manager of Pacific Wire Rope Co., announces the appointment of Clayton L. Parkhill, Jr. as general sales manager, with headquarters in Los Angeles. Parkhill has wide

Clayton L. Parkhill

experience in the construction field. At one time he was national director of sales for Yuba Consolidated Erectors, and according to Spear will add considerable strength to Pacific's sales force.

Pump sales manager appointment

Ralph B. Carter Co., Hackensack, N. J., has appointed G. L. "Gerry" Babcock as sales manager of its Pump Division. Bringing to his new post an extensive background of experience in the heavy construction machinery field, Babcock will be in charge of sales and distribution of the contractors' line of Humdinger self-priming centrifugal and diaphragm pumps, as well as other industrial lines.

Two to top posts

Announcement of two top level executive appointments is made by Porter-Cable Machine Co., Syracuse, N. Y. W. Dean Wallace has been named general manager of the company's Gasoline Products Division, while Ralph H. DeRubbo has been appointed general administrative manager.

Wernsing resigns from Skookum

The Skookum Co., Inc., of Portland, Ore., announces the resignation of K. L. Wernsing, vice president and sales manager. Wernsing is entering into partnership with McGaraghan Supply Co., Eureka, Calif. For the past ten years he has managed the dealer organization of Skookum, servicing the construction equipment needs throughout the United States.

Athey appoints new chief engineer

William H. Bechman has been appointed to the position of chief engineer of Athey Products Corp., Chicago. Bechman, who has spent most of his working career in the heavy equipment field, will be responsible for all engineering of the Athey lines of pneumatic-tired, off-highway trailers, Force-Feed loaders, and Forged-Trak equipment.

Chief engineer named by A-M Construction Equipment Div.

Appointed chief engineer of American-Marietta's Construction Equipment Division, Milwaukee, is R. W. Kling. He joins the organization with a strong background in

R. W. Kling

the heavy construction field, formerly serving as vice president of engineering for Athey Products Corp. The division was formerly known as the Seaman-Andwall Corp., an A-M subsidiary.

Ackmann takes on new responsibilities at Insley

New job responsibilities for Assistant Sales Manager I. K. Ackmann are announced by W. T.

Elliott, director of sales, Insley Manufacturing Corp., Indianapolis. Under the new organization structure Ackmann will assist J. Ray Elliott, vice president and sales manager of the Western Region, besides assisting R. J. Boatman, salese manager for Eastern-Central regions. Elliott heads the newly established regional office at Alhambra, Calif.

American Hoist new subsidiary

American Hoist & Derrick Co., St. Paul, Minn., has acquired the Industrial Brownhoist Corporation of Bay City, Mich. Industrial Brownhoist will be operated as a wholly-owned subsidiary of American Hoist.

Kern County Land Co. starts Bakersfield project

A 6,000-ac. residential, commercial and industrial development has been launched at Bakersfield, Calif. by Kern County Land Co. and Del E. Webb Construction Co. The Stockdale Development Co., owned jointly by Webb and Kern, will direct the development on properties extending southwest from Bakersfield.

The Webb firm, besides participating as a share owner, will act as contractor. Kern County Land participates as a share owner and in planning. Stockdale lands will be sold to the development corporation on a long-term contract.

Kings River power contract awarded

AWARD of a contract for construction of the Kings River Powerhouse building, Fresno County, to Rothschild, Raffin and Weirick, Inc., of San Francisco was announced by Pacific Gas and Electric Co. Tunnel driving on the power development has been in progress since last September. Preliminary excavation of the powerhouse site at the upstream end of Pine Flat Reservoir was completed April 1. The new contract calls for work on the powerhouse building and other related work, the next major step, to begin by July 1. Installation of the electrical and mechanical equipment and the penstock will be covered later by separate contracts.

Kings River Powerhouse, scheduled for service in 1962, will complete the $80,000,000 Kings River Project begun by PG&E in 1955, of which two plants already are in service.

The powerhouse contract includes construction of a concrete building 84 x 48 ft. and 81 ft. high to house a 42,000-kw. turbine-generator unit. The generator will be enclosed below a top deck nearly flush with the surrounding powerhouse yard. Access will be through a hatch in the deck. The powerhouse will operate automatically, using water previously released through the Balch and Haas powerhouses upstream.

EBMUD to build Mokelumne River dam

THE East Bay Municipal Utility District will build a new dam for Mokelumne River storage to meet future domestic and industrial water requirements of East Bay communities. The dam site recommended by Bechtel Corporation engineers is situated in San Joaquin County, 10 mi. below Pardee Reservoir, EBMUD's present main storage facility.

The District's board of directors has approved a recommendation by Bechtel for construction of what will be known as Camanche Dam, with a storage capacity of 355,000 ac. ft. Federal appropriation for additional flood control features, recommended by the U. S. Army Corps of Engineers, will, if approved by Congress, boost total capacity of the new reservoir to 418,000 ac ft. Bechtel will proceed at once with designs for the dam. Target date for completion of Camanche is 1964. Bechtel Corporation was retained by EBMUD in 1958 to review the Mokelumne storage problem and to make recommendations. The Bechtel conclusions are based, in large measure, on 10 years of study by EBMUD's own engineers.

$6,000,000 office development planned

PLANS for construction of a $6,000,000 suburban office center have been announced for South San Francisco. The project is being undertaken by the Mar-Company Enterprises. Spokesman for the group is William H. Acheson, vice president of Associated Construction Co. which will build the center.

Garden court offices will be a feature of the new development, designed to meet the needs of the rapidly expanding community of manufacturing and distributing firms of the adjacent industrial area as well as the many San Francisco firms looking to the suburbs for expanded facilities, Acheson said.

The center, to be called "North Mark," will be a complete, self-contained office community including restaurant, bank, post office, sales meeting and conference accommodations. More than 100 firms will be located in the center when the three-phase project is completed. It will be located on a 9-ac. site between Bayshore Freeway and Airport Boulevard just south of the South San Francisco interchange. Adjacent to the proposed center on the south is the Airport Boulevard Industrial Park and immediately east is Utah Construction Company's $55,000,000 industrial park.

ADVERTISERS in this issue