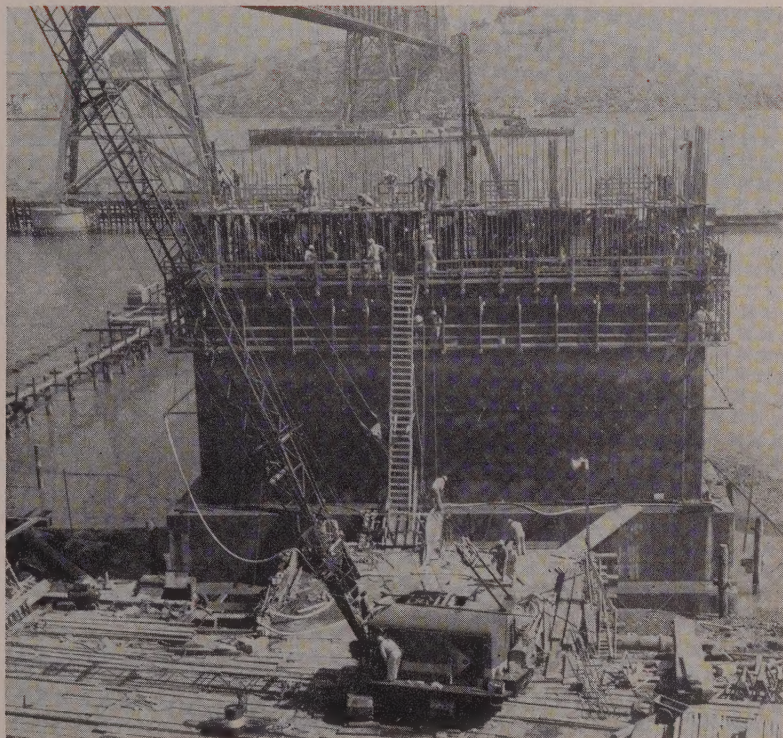


SEPTEMBER

Slip-forms for bridge piers

The West scores two construction firsts by using the Concretor slip-form system on bridge piers and by controlling all hydraulic jacks automatically from a central console. Equipment and process described in detail.



ONE OF THE MOST significant aspects of the Carquinez Bridge project now under construction 30 mi. north-east of San Francisco is the extensive use of slip-forms for piers. Fifty are being built by this method to support the Crockett interchange structure at the south end of the overwater portion of the bridge.

The biggest one, 20 x 80 ft. in cross section with interior cells and 106 ft. high, was built by Mason & Hanger—Silas Mason Co., Inc., and F. S. Rolandi, Jr., Inc., the joint venture which holds the substructure contract for the bridge (see page 31). The rest are being built by Peter Kiewit Sons' Co., general contractor on the interchange structure.

Supplying the equipment on a rental basis on all the slip-form work is B. M. Heede, Inc., an international organization with main headquarters in Sweden. Heede has opened up its first office in the West at 630 Sixth St., San Francisco 3, Calif.

This marks the first time that this technique of forming has been used on bridge piers in the 11 Western States, and the first time in the nation that an automatic controller, de-

veloped in Sweden by Heede, has been used to activate the hydraulic jacks.

The use of hydraulic jacks is a fairly recent development in itself. The usual way to lift the forms has been with screw jacks, which require a large labor force to operate. With manually operated screw jacks it is almost impossible to lift the forms evenly.

The use of hydraulic jacks frees the slip-forming process from these disadvantages. The labor force required is greatly reduced because all the jacks can be controlled from one point by one man. And on the Carquinez job the lifting is completely automatic.

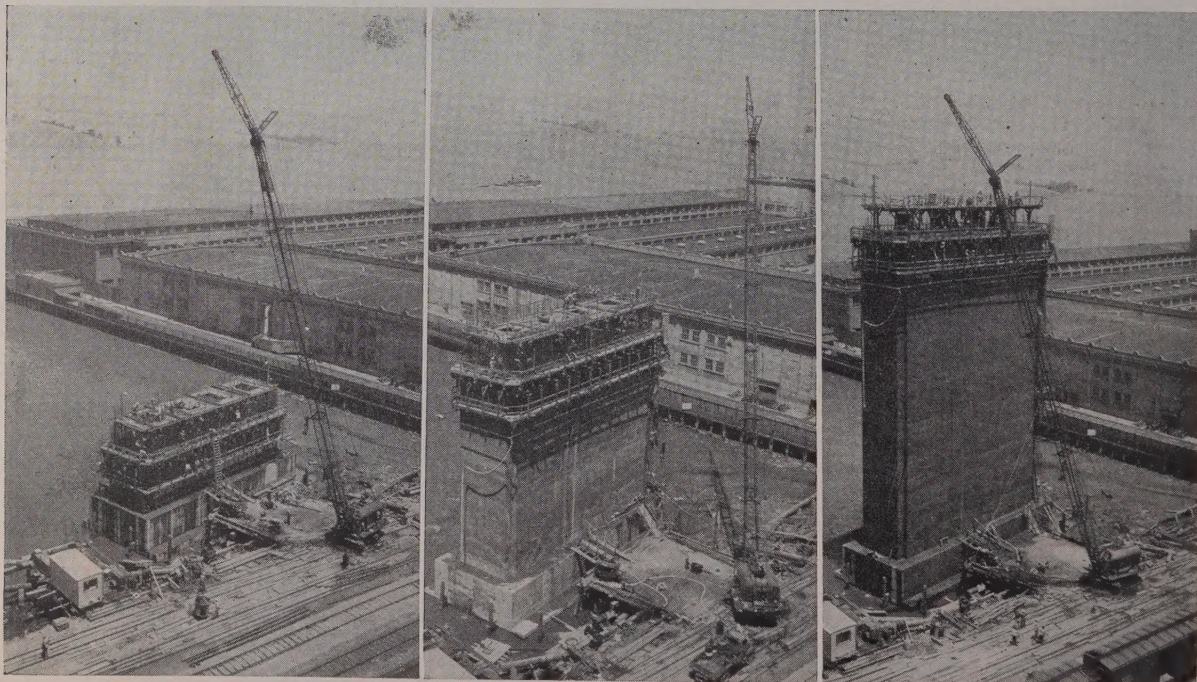
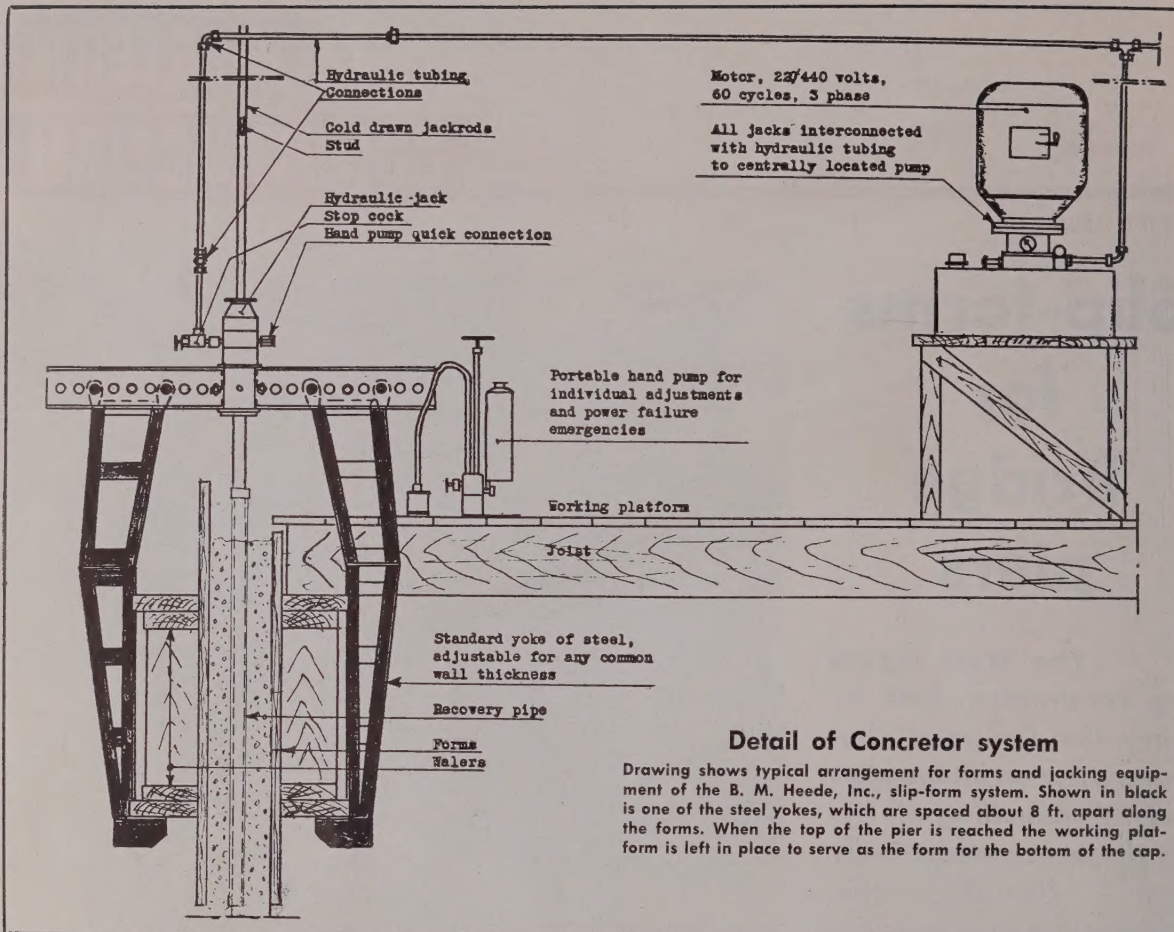
The jacks climb up vertical jack-rods by alternately gripping with two sets of jaws. The jackrods are extended as the work progresses by joining sections together with a threaded stud. In Heede's Concretor system the jackrods can be removed from the concrete if desired, as on this job. A 3-ft. section of pipe is connected to the lowest part of the hydraulic jack which prevents the rod from contacting the unset con-

crete. Thus the rods are standing in small vertical holes and can be withdrawn at the end of the job by a special levering device.

The accompanying drawing shows how the forms are set up. First step is to build the 4-ft. high forms, made of 3/4-in. plywood. Walers are 2 x 6's, 18 in. apart. Then the jacking yokes are assembled and positioned about 8 ft. apart. Next the working deck is constructed and all jacks are connected to the central pump. The pump is operated by a 2-hp. engine and can supply as many as 100 jacks with pressures up to 3,500 psi.

An upper platform is built about 15 ft. above the working deck. The steelworkers do much of their work from this upper platform, inserting vertical bars through holes or notches.

At the beginning concrete is poured into the forms in about 8-in. lifts until the 4-ft. high forms are full. Lifts this small permit good inspection, thorough vibration. Vibration is sometimes not done in slip-forming for fear of bursting the forms but it is being done on this job with excellent results. Mason & Hanger



GOING UP—EXPRESS: Picture at the left was taken on second day of pouring, the middle one on the fourth day, and picture on the right on the sixth day. Average progress was about 20 ft. per day on this pier, which was built by Mason and Hanger—Silas Mason Co., and F. S. Rolandi, Jr., a joint venture holding a \$5,500,000 substructure con-

tract. Hanging beneath the scaffolding for the finishers is the pipe with fog nozzles which sprayed water on the concrete. On this pier, work was suspended over the weekend. One man remained to give the forms several small lifts to keep them from sticking to the setting concrete. Reinforcing steel is placed from the top working platform.

used a distributing hopper on the working deck into which the cranes emptied. Buggies carried concrete from the hopper to the forms. Kiewit is using an elephant trunk on the crane bucket and unloading directly into the buggies.

The initial filling of the forms takes about 3 hr. and when finished the concrete at the bottom is hard enough to carry the weight above it so that jacking can begin. An experienced man can judge how fast the concrete is hardening by pushing a thin steel rod down into the concrete.

The speed of lifting is set by making an adjustment on the timer of the central control mechanism. It varies from 5 to 14 in. per hr., with the higher figure being reached in the daytime when the temperature is highest. The average is about 8 in. per hr. which means that the concrete emerges from the forms about 5 hr. after it is poured. This speed is surprising to those persons accustomed to keeping concrete in the forms for a day or more.

The pouring continues 24 hr. a day. Several of the piers were over 100 ft. high and with an advance of 18 ft. per day they could not be finished in a five-day week. In these cases it was found feasible to simply shut down for the weekend. This introduced nothing more serious into the structure than a normal construction joint. To make sure that the concrete did not stick to the forms one man was left on the job to give the forms a few small lifts as the concrete hardened. When work began on Monday morning a trial lift was made before concrete pouring began. The piers now being poured are shorter, being further up the slope of the hill, and can easily be completed in 5 days.

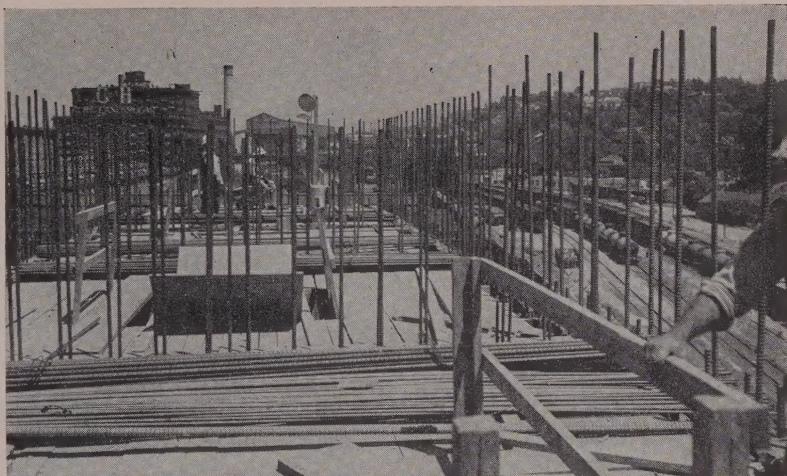
As soon as the form is far enough above the starting elevation, a hanging platform is built for the concrete finishers. Concrete emerges from the form in proper condition for finishing with minimum effort. Any type of finished surface can be produced. In this slip-form process it is not necessary to fill holes or remove fins, which consume time in normal finishing.

Below the finishing platform a water pipe is attached and extended around the pier. Fog nozzles provide excellent curing results.

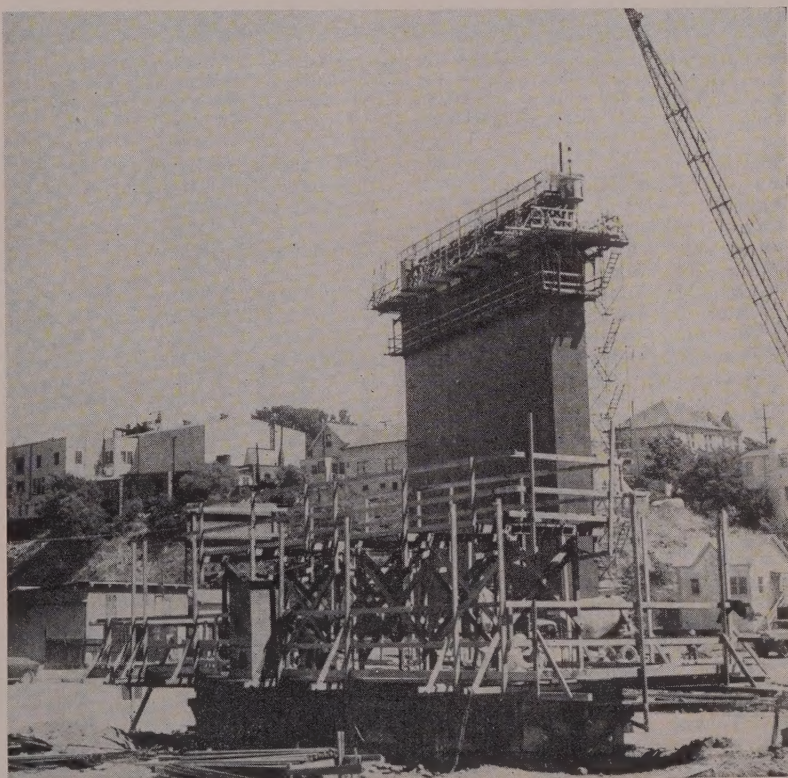
When the top of the pier is reached an ingenious way to form the cap has been worked out. Pins are driven under the low walers on the inside forms into the hard concrete and the inside legs of the jacking yokes are removed. Lifting of the outside forms continues in the usual manner up to the required elevation. The working deck is left behind to act as the inside form for the bottom of the cap.

Slip-forming started on June 27 and the last of the 50 piers should be finished in December.

Two features of this slip-form method are worthy of mention. First



VIEW of the upper platform, built about 15 ft. above the working deck, on which much of the steel work is done. Note that a full supply of reinforcing steel is carried along as the forms rise, instead of lifting it up as needed.

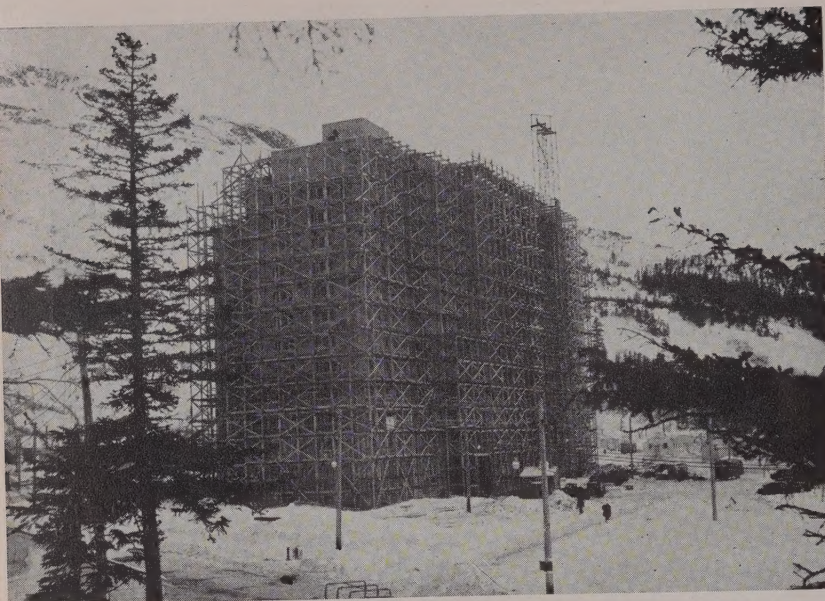


IN THE FOREGROUND forms and scaffolding are being assembled prior to pouring. In the background a pier nearly 100 ft. in height after 5 days and nights of continuous pouring. Hydraulic jacks automatically controlled make form lifting so smooth the motion can scarcely be noticed.

is the advantage of unusual safety, as compared to the ordinary procedure which involves loosening, lifting and placing outside forms. These are hazardous operations at best, especially at heights of more than 100 ft. and in areas where strong winds are rather frequent. This safety feature is an important advantage in using slip-forms. Second, there is the need for realizing that time is required to set up the form and its accessories at the start of work on each pier. More important is the time required to dis-

mantle and lower the form and jacking equipment when the pier is finished.

Russell Cone is project manager and L. L. Snedden is chief engineer for Mason & Hanger-Silas Mason Co., Inc., and F. S. Rolandi, Jr., Inc., a joint venture. Homer Olsen is general superintendent for Peter Kiewit Sons' Co. Oscar Johnson is resident engineer for the California Division of Highways. For B. M. Heede, Inc., Tord Carmel and Carl Eriksson are supervising engineers.



SPACE LIMITATIONS required the Army to use "vertical housing" at the Port of Whittier. This is the largest apartment building in Alaska, and is designed for 177 families. In an average year the weather dumps 180 in. of rain and 208 in. of snow, combined with winds of more than 100 m.p.h. to create major construction problems.

ALASKA may be noted for its millions of acres of land, but conditions at the Port of Whittier required designers to conserve space with a fourteen-story structure due to the scarcity of building room.

Patti - MacDonald Construction Co., St. Louis, Mo., is pushing toward completion a fourteen-story apartment building under a \$4,029,620 contract with the Alaska District, Corps of Engineers, U. S. Army, at this military port of entry to the far-flung interior. Squeezed into a ½-mi. triangle of level land, surrounded by majestic mountains and glaciers, Whittier lies 62 mi. southeast of Anchorage at the west end of Passage Arm, a 700-ft. deep fjord connecting to the Gulf of Alaska through Prince William Sound.

Passengers to this strategic port are treated to large-scale photogenic scenery that rivals Switzerland and Norway. Ships wind in and out through deep narrow straits and sounds with gleaming glaciers carpeting the steep valleys of Chugach Range and moving the irresistible force of their ice rivers down to tide-water along the rugged coastline. There are no highways to this isolated, ice-free, all-year-around port. A single-track railroad burrows like a mole under the mountains with 13,000 and 4,900-ft. tunnels to connect with the Anchorage-Seward mainline at Portage on Turnagain Arm.

The port of Whittier, born during the early days of World War II, is also noted for its wild and woolly weather. A yearly average of 180 in. of rain and 208 in. of snow makes it one of the wettest and snowiest places in the world. Winds lash up from the Gulf of Alaska and blast the port and any construction activity

with gusts up to 110 m.p.h. During a three-day period, the wild williwaws averaged 90 m.p.h.

Two tall buildings

Skyscraper design was initiated in the port's building program when in 1953 Haddock Engineers of California completed a \$6,000,000 composite building. This seven-story city under one roof, houses 1,200 bachelor officers and enlisted men, and also contains offices, hospital, messhalls, bowling alleys, theater, snack bars, post exchange, commissary, library, post office, hobby shops, service clubs, recreational day rooms, barber and beauty shops, a rifle range and jail. Its 538 rooms have 1,002 windows and 1,117 doors. It took four men to carry the 932 keys that went with the building when it was turned over to the Army by the contractor.

The new fourteen-story apartment project to provide married quarters for the base personnel contains 177 one, two, and three-bedroom apartments and 39 civilian quarters. This large skyscraper, at least for Alaska, is 268 ft. long by 42 ft. wide with two wings running back 49 ft. long by 42 ft. wide. The two elevator penthouses reach 152.5 ft. above the ground. It is understood that this is the highest building in Alaska. The contract was awarded May 13, 1954, and the original completion date was set for July 1, 1956. However, due to several strikes, the completion time has been extended to August 29, 1956.

Project manager says . . .

When interviewed G. E. Lefler, project manager for Patti-MacDonald work in Alaska, had the following

Alaska's Skyscraper

Contractor carries up a false roof 14 stories to protect against tough weather conditions in building apartments for the Army at Port of Whittier.

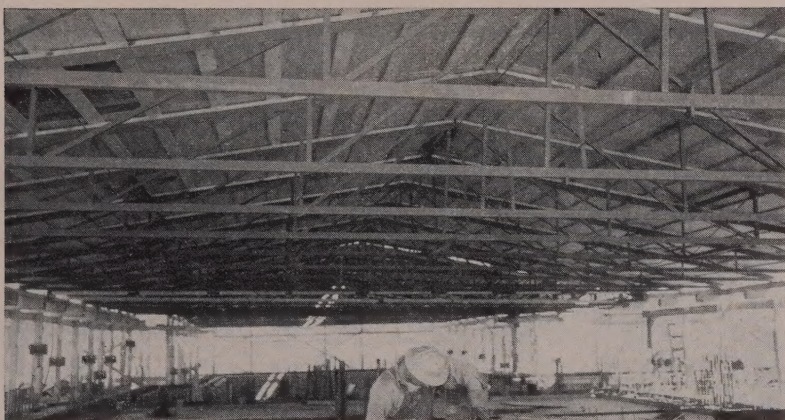
to say about the Whittier job:

"Due to the fact that everything had to be shipped from stateside to Whittier, including equipment, it was rather late in the season before the project got under way in 1954. As a result, part of the reinforced concrete building was placed only to the second floor and a portion to the third floor level before the winter shut-down. The 1954-1955 winter snowed the job under with a record 73-ft. snowfall. This caused a late spring breakup and consequently, an extremely late start for the 1955 season. Alaska has taught us old-time contractors in the Far North to include weather and late breakups in our bids. However, the job got rolling with full momentum in June, and we were able to place a floor a week during the rest of the season.

"A great deal of this progress can be attributed to the temporary roof we dreamed up and designed. It was used all the way up on the fourteen-story structure. The building was completely surrounded with scaffolding, and steel trusses 52 ft. long were designed and fabricated to span over the entire building. Spacing these trusses on 7-ft. centers and decking with ¼-in. plywood nailed to truss stripping in shingle fashion, we had a roof over our heads as we built upwards.

"With a drop canvas skirt around the false roof perimeter, work progressed in the dry in spite of rain, snow, and wind. This construction roof was raised by a series of cables operated by Saxon hoists, fixed to the outside-the-building scaffolding. The keep-in-the-dry roof was split in five sections and each section could be raised in from 20 to 30 min. As the yearly rainfall at Whittier is about 170 in. it meant we had some rain nearly every day of the summer season."

Harold E. Gall, Alaskan general superintendent, added the following



UNDER THE BIG TOP—Construction proceeded without interruption when the contractor devised and installed this false roof that was carried up floor-by-floor, supported by the scaffolding surrounding the building. The steel trusses of this false roof spanned the entire 52-ft. width of the structure. Built in five sections, the roof was raised by hoists mounted on the scaffolding. A canvas skirt, dropped when required, permitted work to proceed in spite of rain, snow or wind.

facts: "Another feature that helped speed up progress on this tall building was the fact that practically all floors were typical. This allowed us to use a bar joist for our purlins to support the concrete forms for all slab work, and eliminated a lot of shoring."

Bill Wickstrom, reinforcing and iron work foreman on the job, chimed in with: "All reinforcing steel was taken to the floor by a Chicago boom attached to the tubular hoist that was used to raise materials and concrete. As we moved upward, it became a major problem to hoist this steel and pour concrete at the same time. As a result, we set a 22-B crane in the back of the building between the two wings and built a 140-ft. boom for this piece of equipment. This crane raised all the remaining reinforcing steel, all the structural steel window frames, the pipe for the mechanical trades, and many other building materials, as the hoist was tied up most of the time on concrete

placing. The crane could deposit on either wing of the building."

Bob Landau, office engineer, commented: "This long-boom crane permitted the work to go ahead progressively, and tended to speed up operations. The building was under roof before the close of the 1955 season. Six unit heaters were set in the hallways of various floors to produce 1,200,000 B.T.U. and enable winter work on interior finish. It is anticipated that the job will be completed July 1, 1956, on the original completion date."

Jack Foster, concrete foreman, said: "All the concrete aggregate for the building was processed by ourselves at Mile 9.2 out of Whittier. A Noble plant was used on the concrete batching. Due to the short haul on the job, the mixer trucks did not have sufficient time to mix between the batch plant and the building. A Mixermobile unit was installed under the batch bins of the plant to pre-mix the concrete before discharging

into the mixer trucks. This set-up gave us a well-mixed concrete."

Sam Berry, project construction superintendent, added the following comments: "Strange as it may seem, the labor turnover was not above normal. One of the big problems in the Whittier area is to keep equipment in operation. The mechanical repair shop soon found that due to the area's deposit of volcanic ash and its ability to float on the rainwater puddles, brake linings were soon cut out and brakes on the busses and pickups had to be relined every two or three weeks.

"The continuous rain made a bad condensation problem. As a result, all motors were hard to start in the morning. Snow and the wind during the winter months were extremely bad. We had a crew of men working all winter inside the building, and it was quite a problem to get them to work from our construction camp 3 mi. away. It was not uncommon to have winds up to 85 m.p.h. for as long as 3 hr. at a stretch. You can imagine how it blocked the road with snowdrifts. Although the 1955-1956 snowfall was only about half of the previous year's 73-ft. record, the past winter's winds were much above normal."

Carl Eilertson, resident engineer for the Alaska District, Corps of Engineers for the past ten years, had this to say about the Whittier apartment project: "In my opinion the contractor has done an excellent, well-planned job in spite of very adverse weather conditions. Another highlight of the construction has been that to date there has not been a single lost-time accident."

Personnel

The fourteen-story skyscraper project at Whittier, Alaska, had the following personnel involved in the construction: Patti - MacDonald Construction Co.: G. E. Lefler, project manager for Alaska; H. E. Gall, general superintendent for Alaska. Alaska Office in Anchorage: Robert Landau, engineer, with Keith Morgan, Clayton Davis, and Walter Chinn handling the office work.

In the field Patti-Mac had Sam Berry, project superintendent; William Patterson, assistant superintendent; Esper Burghardt, carpenter superintendent; Jack Foster, concrete foreman; Bill Wickstrom, steel foreman; August Scheele, master mechanic.

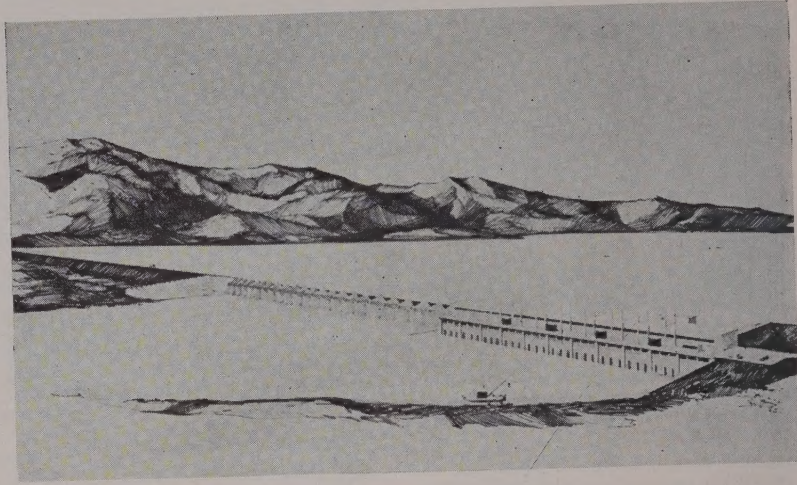
For the U. S. Army, Corps of Engineers: Colonel L. L. Haseman, Acting Alaska District Engineer; Warren George, chief of engineering; John England, chief of construction; John Longacre, engineer—south. Projects—south: Bill Broadwell, Dave Nicholls, and resident engineers Carl Eilertson, Arthur Peckham and William Boback at the project site.



SUPERVISING STAFF included this group (usual order): Esper Burghardt, carpenter foreman; Jack Foster, concrete and labor work; Carl Eilertson, resident engineer; Samuel Berry, construction superintendent; William Patterson, assistant construction superintendent.

Work starts at Priest Rapids Dam

Preliminary work at site improving access road has begun on project which will be third biggest power producer in nation. Contract was largest ever awarded to single firm. Workers may reach 3,000.



BONDS HAVE BEEN SOLD, the contract has been signed, and work has started on access roads into the Priest Rapids Project site on the Columbia River in central Washington. The \$91,878,000 contract, the largest ever awarded to a single firm, is held by Merritt-Chapman & Scott. It will require about four years for completion with from 2,500 to 3,000 men employed at the peak of construction.

The first part of the contract to be undertaken is the construction of a 14-mi. road to connect Beverly and the dam site. This is being carried out by Cherf Bros. & Sandkay, holder of a subcontract. It will be an oiled road and should be complete by October. Grant County is handling the acquisition of rights-of-way and the engineering and will take over the maintenance when it is finished.

Merritt-Chapman & Scott has set up its offices in Ephrata and the project is under the direction of Project Manager D. E. Stinson and Project Engineer R. J. Jenks.

Personnel

Harza Engineering Co., which designed the project and which will supervise construction, has appointed Robert B. Jackson as resident engineer and Bert Hall as assistant resident engineer. Robert Laughlin has been resident engineer on the preliminary investigations. C. K. Willey is vice president and Western regional manager for Harza. Robert Ries is chief engineer of Grant County Public Utility District for which the project is being built.

M-C & S's bid was approximately \$1,250,000 lower than the next bid and was the only one of the five bids submitted that was made by a single company. The other four bids were submitted by joint-venture

combinations of 28 major construction organizations from all parts of the country.

Grant County PUD also has a license from the Federal Power Commission to build a second hydroelectric installation of about the same size as Priest Rapids 18 mi. upstream. Construction on this project, called Wanapum Dam, will get under way in two years under a separate contract. The combined capacity of the two installations will be 1,200,000 kw., making the development the third largest power producer in the United States.

No tax or government money will be used in the construction of the development. It is being financed entirely by the sale of revenue bonds which will be retired through power sales.

The dam

The major part of the project calls for the construction of an 8,412-ft. long reinforced concrete and earth-fill dam, of which 2,427 ft. will be concrete and 5,985 ft. earthen embankment. The dam, which will extend in a straight line across the river, will have a maximum height of 175 ft. from the deepest point of excavation. It will include a 1,142-ft. long reinforced concrete spillway section containing 22 gates, each 50 ft. high and 40 ft. wide; a powerhouse 900 ft. long and 205 ft. wide; rockfill embankments extending to high ground on either side of the river; upstream migratory fish passages and provisions for a future navigation lock.

The dam is the second in the State of Washington to be constructed by Merritt-Chapman & Scott. The company's Construction Department currently is building Gorge High Dam across the Skagit River, about 100 mi. northeast of Seattle, for the City

of Seattle as a municipal power project. The Gorge High Dam was started as a joint venture with the Savin Construction Corporation, of East Hartford, Conn., which last fall became a member of M-C & S. Merritt-Chapman & Scott and Savin also recently completed construction of Folsom Dam across the American River in California's Central Valley for the U. S. Army Corps of Engineers. The dam was dedicated May 5.

Fill totals 3,210,000 cu. yd.

The Priest Rapids Dam project will require the use of about 910,000 cu. yd. of concrete, and 3,240,000 cu. yd. of rock and earth will be excavated. A slightly lesser amount of fill—3,210,000 cu. yd.—will be required.

The spillway section, the most massive part of the dam, will be 218 ft. wide at the base and 31 ft. wide at the top.

The powerhouse will contain eight generators with a rated capacity of 78,850 kw. each. Space will be provided for the installation of two additional generators at a later date.

Future lock

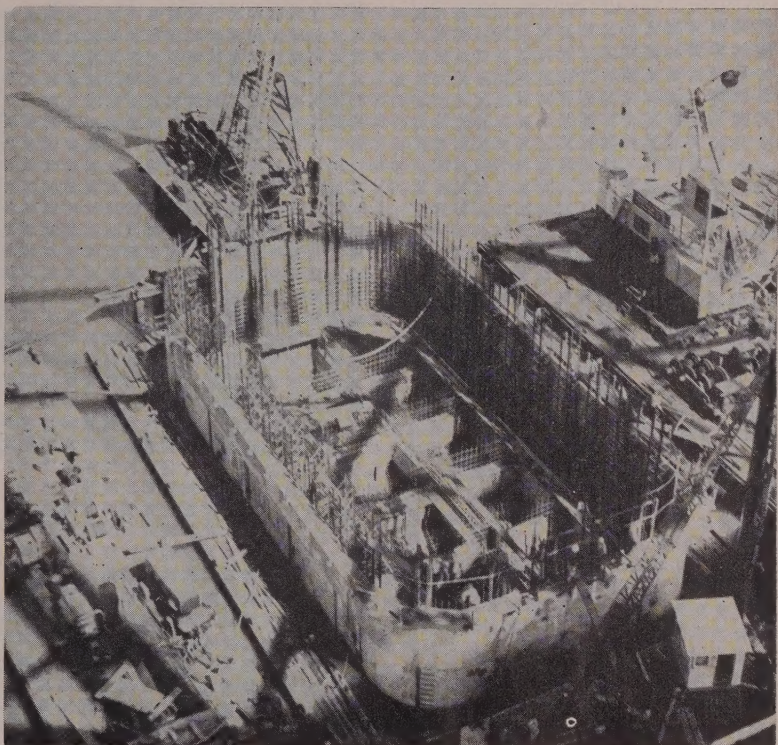
Provision will be made for a future navigation lock, 1,000 ft. long and 250 ft. wide, on the right side of the river, facing downstream, at the dam site. Two fish ladders, one on each side of the dam, will be constructed.

The contract also calls for the construction of an 18½-ft. wide concrete and asphalt road along the top of the dam and for the construction of access roads from existing highways on either side of the river.

When completed, the dam will provide a reservoir area of 22 sq. m. and will have a drainage area of 95,500 sq. mi.

Sinking first caisson at Carquinez

First of three caissons is being sunk to bedrock in biggest job of kind since the San Francisco Bay Bridge. Swift and changeable tidal currents make deep water work difficult. Caisson and pile-supported working platforms secured to sixteen 25-ton concrete anchors. Air-lift pumps aided by jetting help remove material from bottom.



FIRST CONCRETE has gone into the cutting edge of Caisson Arnold and the steel structure has started its slow trip to the bottom of Carquinez Straits in Northern California. Arnold, named after Arnold Hanger, president of Mason & Hanger-Silas Mason Co., Inc., one of the participating contractors, is the first of three caissons to be sunk to bedrock to form part of the foundation of the Carquinez Bridge. When finished in 1958, the \$23,000,000 bridge will parallel the existing bridge and will be an important part of the freeway system around San Francisco Bay. The reasons behind the decision to build a parallel bridge and the description of the overall project were given in an article by Claude H. Darby, Senior Bridge Engineer of the California Division of Highways, in the Sept. 1955 issue of **Western Construction**.

Substructure contract

Holder of the \$5,455,000 substructure contract is Mason & Hanger-Silas Mason Co., Inc., and F. S. Rolandi, Jr., Inc., a joint venture. The job involves sinking to position on bedrock the three biggest caissons built in the West since the San Francisco Bay Bridge was constructed in the late 1930s. One of the caissons will support the north pier, the other two the main center pier. The contract also includes two shore piers and another water pier which will be built in a cofferdam and which will

THE 53 x 102½-ft. steel cutting edge is secured in place, ready for concrete which will force it down 132 ft. to bedrock. Outside forms are 4-in. precast concrete panels sealed by tape.

rest on 260 steel H piles bearing on bedrock.

The cutting edge for Caisson Arnold was fabricated at Bethlehem Pacific Coast Steel in San Francisco. It is 53 ft. wide, 102½ ft. long, and 13 ft. high, made of steel plate. Like the concrete portion of the caisson being built above it, the steel cutting edge has 18 cellular openings, 14 ft. square, arranged in three rows of six. Through these openings mud, sand and gravel from the bottom of the strait will be removed as the cutting edge is forced down to bedrock by the increasing weight of concrete being placed on it at the water surface.

Each of the cells in the cutting edge is sealed by a laminated wood plug or false bottom. Each plug has a 30-in. diameter dredge well opening. The openings will be uncovered when the cutting edge has penetrated to the bottom, about 105 ft. below the water surface, and through them the softer material will be removed by an air lift pumping system. When necessary the false bottoms can be knocked out and the material removed by clamshell buckets.

The cutting edge was launched from its drydock on May 25. The second one was launched on July 30, and the third is now being fabricated. The three are identical.

Before the cutting edge was floated into place, crews of Mason and Hanger constructed working platforms and carried out some dredging at the pier location. Floating stiffleg derricks equipped with clamshells lowered the mud line from minus 85 ft. to minus 95 ft. Bedrock lies at minus 132 ft.

At pier 2 there are two working platforms. One is temporary, the other will remain in place as a fender. The temporary platform rests on 18 and 24-in. diameter steel pipes filled with gravel. These pipes will be salvaged and used in the fender system of the center pier.

Working platform problem

Construction of the working platforms posed a problem because of the great unsupported length of the supporting pipe piles (85 to 110 ft.) and the widely varying current in the Carquinez Strait. The current is composed of the flow of the Sacramento and San Joaquin rivers and the incoming and outgoing tides. For this reason the current can be in either direction and when the tide is going out its velocity can reach 7 ft. per sec.

If the force of the current on a pile induces vortices with the same period as the natural period of the unsupported length of pile, it can cause the

pile to vibrate excessively. The contractor had to make sure that this resonant vibration would not occur at any of the water velocities. By connecting the piles with a diagonal bracing system, the stability of the pile group was improved, because if any one of the piles was in resonance with the current, its vibration would be dampened by the support of adjoining piles of a different size. This bracing system has the further effect of reducing the unsupported length since part of it is 25 ft. below the tops of the piles, 15 ft. below water.

Vibration a problem

Constructing this bracing system was very difficult because of the excessive swaying motions of the piles. The contractor first connected temporary braces consisting of pairs of 12 x 12's about 25 ft. below the tops of the piles where the lateral motion was not so great. With the pile group thus partially stabilized, it was possible to connect up the final bracing which consists of pipes clamped to the piles.

Even so, it was found necessary to secure the platforms with snubber cables attached to submerged concrete anchors to reduce or eliminate possibility of vibration.

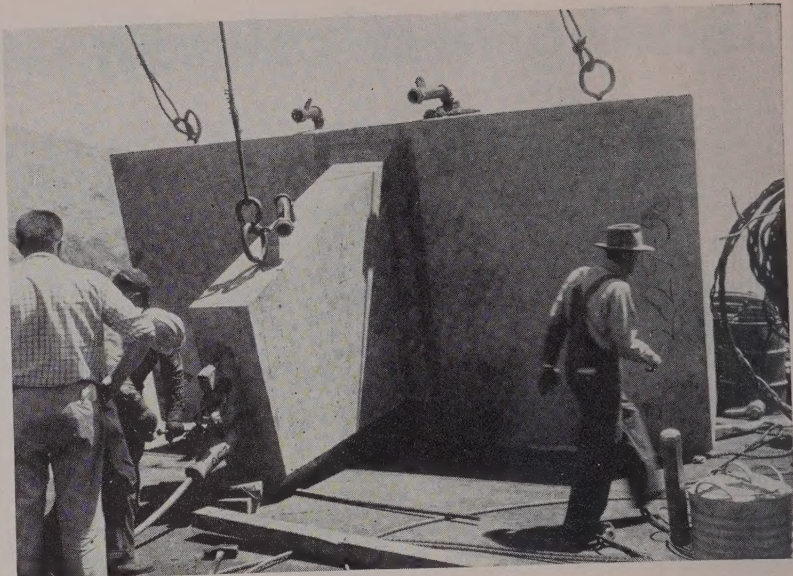
Here is another consideration which could easily be overlooked: The cables themselves had to be analyzed for resonant vibration at the various currents. This was found to be the controlling factor in some cases and the size of the cable had to be increased. Most of the cables being used for platform stabilization are $\frac{3}{4}$ in. in diameter.

Concrete anchors

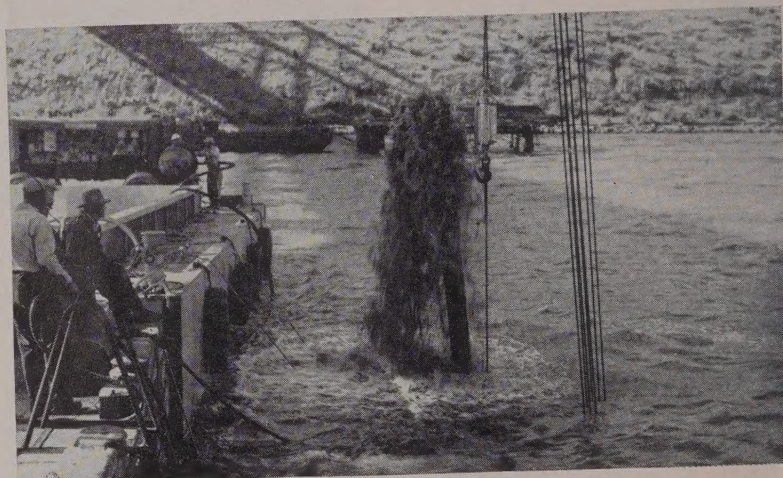
The platform snubber cables and also the cables which keep the caisson in position are attached to concrete anchors manufactured in the contractor's casting yard. There are 16 for Arnold and each weighs 25 tons. The location for each anchor had to be carefully determined so that the cables would not bear against any of the piles or interfere with navigation.

So that the anchors would bury themselves in the bottom they were equipped with seven high velocity jets along the bottom edge. Firehoses were attached to three fittings on each anchor and water was supplied to the jets at about 275 psi. The jetting action would clear away the soft material and permit the anchors to penetrate about 8 ft. below mud line. Occasionally coarse gravel was encountered which could not be moved by the jets and it was necessary to send a diver down to attach an air lift pump. This would enable the anchor to sink about 15 ft. below mud line.

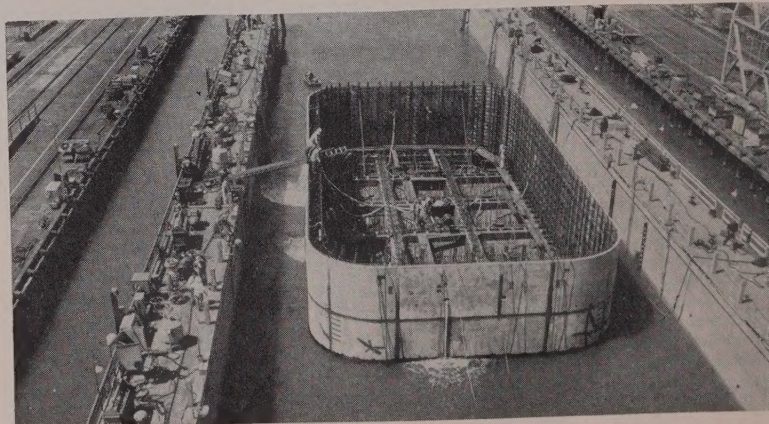
In two locations there was insufficient overburden on the bedrock to give the anchors enough bearing. This problem was solved by sinking two derelict barges by filling them



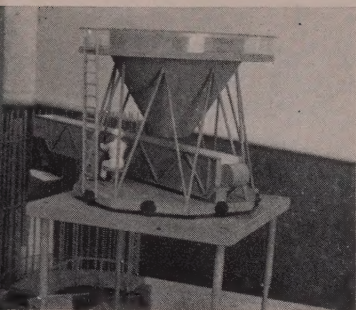
CONCRETE ANCHORS weighing 25 tons hold the caisson in position, stabilize the working platforms. Three pipe fittings at top admit water to seven high-velocity jets along bottom edge to help bury the anchor. Cables from anchors could not interfere with navigation.



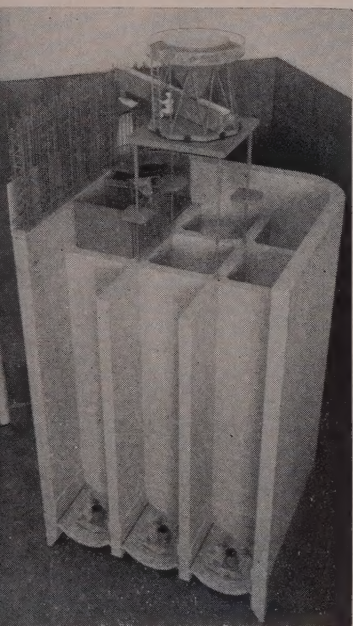
COARSE GRAVEL, which could not be moved by the anchor jets, was removed by air-lift pump positioned by divers. This method lowered some anchors 15 ft. below mudline. Derelict barges were sunk at two points where overburden on bedrock was insufficient for anchor bearing.



STEEL CUTTING EDGE was built in drydock by Bethlehem Pacific Coast Steel and launched like barge. Tugboats pushed it 30 mi. to site. In this view 20 ft. of outside sheathing is resting on 13-ft. high steel cutting edge. There are three caissons in all.



LOSE-UP of model shows unusual concrete distributor. Operator controls rotation of hopper and position of boom which can be extended or retracted. Boom houses conveyor belt.



MAIN FEATURES show up clearly on cut-away model made by Preston Scale Models of San Francisco. At bottom can be seen the wooden bulkheads with the 30-in. diameter well openings. Outside walls are kept one lift higher than inside walls.

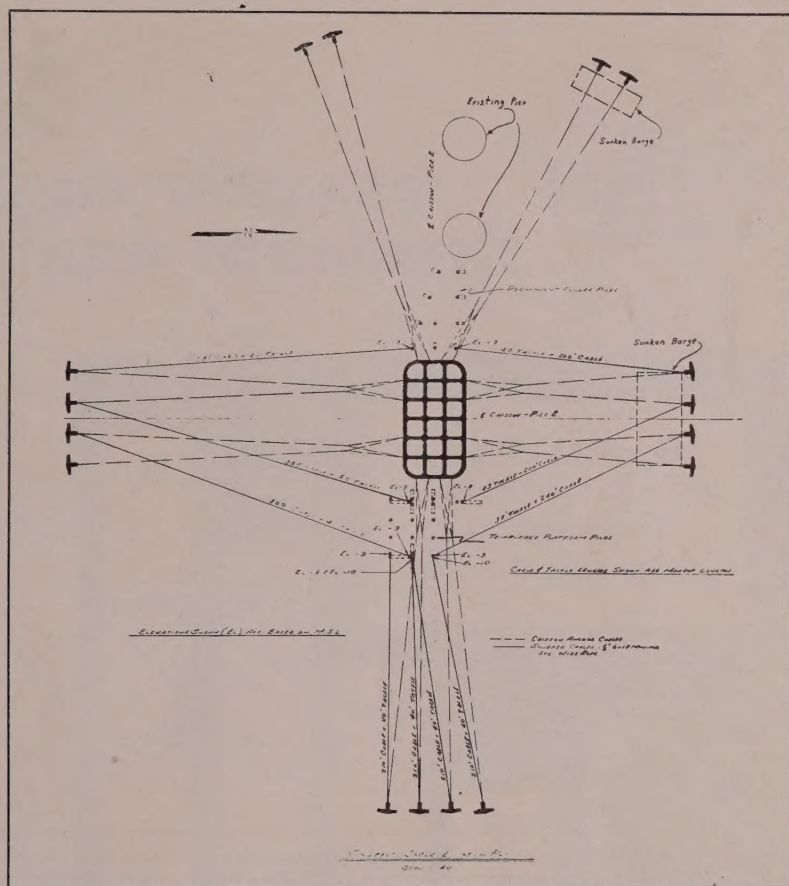
with rock and then filling the space between the barges and the anchors with tremie concrete.

Cables to caissons

The cables are connected to the caissons and the caisson through tackles which permit the tension to be varied as required. The cables are connected to the caisson at both the top and the bottom for maximum control. When it is desired to change the tension or change the position of the tackle, the tackle is taken off the tackle by the crane which is fitted with a well drill-rod clamp modified to fit the cable. An indicator in the crane cable calls the operator what the tension on the cable is.

First caisson placed

On July 16, with the current at a minimum, the caisson for the north



ANCHOR LOCATIONS were carefully determined so cables would not bear against piles of working platforms or interfere with navigation. Dotted lines are caisson anchor cables, solid lines are snubber cables used to stabilize pile-supported working platforms. Cables are attached to caisson through tackles which can be moved as sinking progresses. Note barges which were sunk to give anchors more support. Changing tidal currents complicate work.

pier was maneuvered into place between the working platforms by two tug boats. When it was properly located divers were sent down to hook up the anchor cables. Berthing the caisson was ably directed by Ed Bowman, general superintendent.

Concrete started going into place in the caisson the first week of August. The exterior walls are 3 ft. thick, the interior walls 2½ ft. thick and are built up in 10-ft. lifts. Each lift sinks the caisson about 8 ft.

The outside forms of the exterior walls, which are kept one lift above the interior walls, consist of precast concrete sheathing. The sheathing panels are 4 in. thick and 22 are needed for each lift. When the panels are set in place the joints between them are made watertight with a fiberglass compound and tape, thus enabling them to act as a cofferdam. The reinforcing steel in the exterior walls is in part structural steel trusses cantilevered out of the previous pour, so that it can resist the water pressure on the outside forms.

Most of the forms for the interior cell walls are 12 x 12-ft. steel frame panels faced with plywood manufactured by Monarch Iron Works in

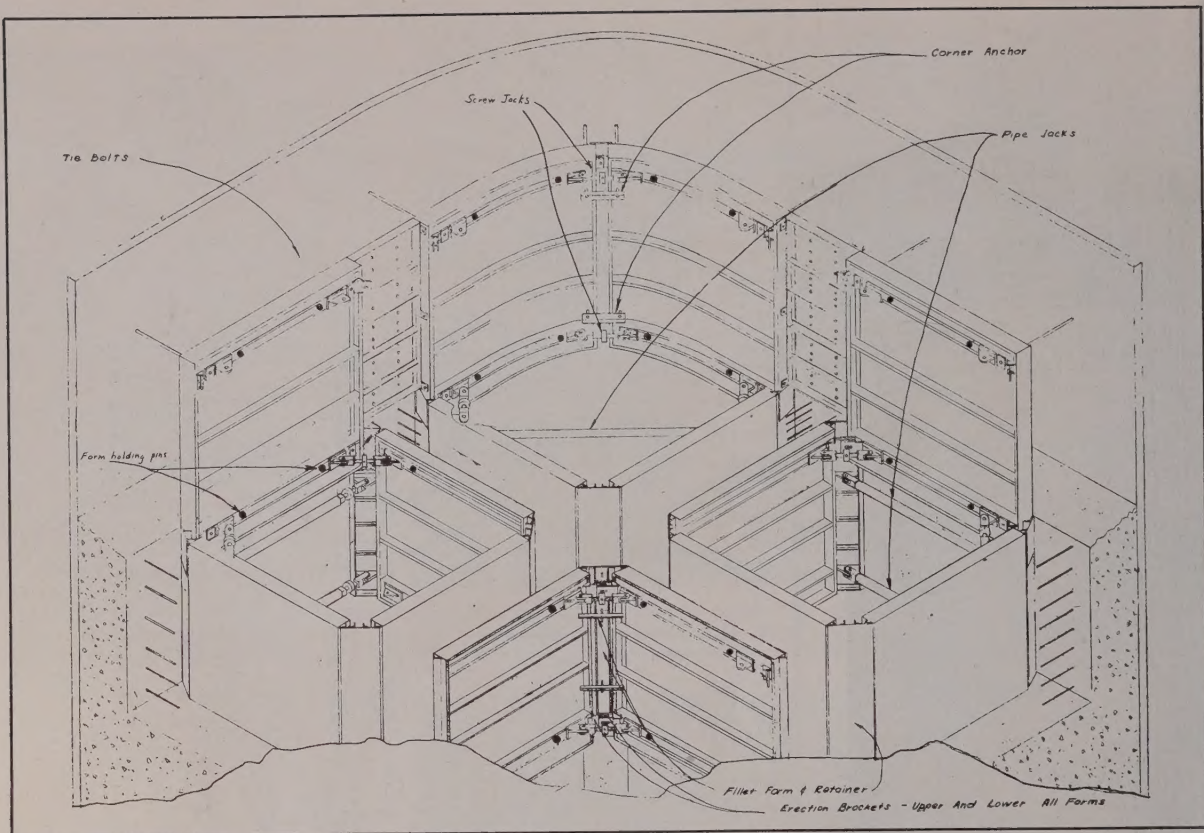
Sausalito, Calif. The 12-ft. depth for a 10-ft. lift leaves two feet of overhang for attaching the panels to the previous pour. This connection is made with steel pins which run through the forms and into tapered holes cast into the concrete.

Form removal method

The method for removing the forms is a good example of the ingenuity being shown by Mason, Hanger and Rolandi on this job. The cells which the 12-ft. square panels form are 14 ft. on a side, permitting the use of small fillet forms at each corner. When the four panels are in place they are connected to one another at each corner by two screw jacks. After the concrete has set, the jacks are turned, drawing the panels a few inches away from the concrete. Then the four panels can be lifted out by a crane and reset. The fillet forms, which are simply steel plates 1 ft. 4 in. and 12 ft. long, are positioned separately.

Noble plant for concreting

Concrete is being mixed and batched in a Noble plant set up on the south shore which can turn out



FORMING SYSTEM was designed by contractor, built by Monarch Iron Works. Forms are 12 x 12-ft. steel frames placed in a square and connected together at the corners by screw jacks. When concrete has set

screw jacks are turned, drawing forms away from wall. Then all four can be lifted together and repositioned. Each 10-ft. lift sinks the caisson 8 ft. Concrete will be distributed by means of a rotating conveyor belt.

120 cu. yd. per hr. The plant is located so that it can discharge directly into special barges. The barges are 28 x 58 ft. and have eight compartments in which tapered bottom-dump buckets are placed. The tapered containers are self-centering so that no concrete will be spilled when the barges are traveling over rough water.

The three barges are handled by one tugboat. While one is unloading at the caisson, the other is being loaded at the batch plant, and the third is in transit between the two points. A barge can make a round trip in 30 min., delivering 40 cu. yd. each trip. They were designed by the contractor and fabricated by Berkeley Steel Construction Co., Inc., from Kaiser Steel plate.

Handling concrete

The concrete buckets are picked out of the barges by the crane and discharged into a hopper on an unusual concrete distributor designed by the contractor and built by the Noble Co. It rests on a platform which can be repositioned as the pouring progresses. On the platform is a circular framework 20 ft. in diameter which can rotate on wheels spaced along its circumference. This framework carries a 9-cu. yd. con-

crete hopper. The hopper discharges concrete onto a conveyor belt housed in a retractable steel boom. One operator retracts or extends the boom and at the same time controls the position of the entire framework which turns on a central axis. In this way the concrete can accurately be directed to any point in a 35-ft. radius.

After it hits bottom

As the caisson sinks no water will be inside of it, although some may be admitted when it nears the bottom to improve stability. When the cutting edge comes to rest on the mud at the bottom the dredge wells in the wooden plugs in several of the interior cells will be fitted with 30-in. diameter pipes reaching to the top of the caisson. It is hoped that only the central cells will be needed for dredging. The 30-in. pipe will house an Intelligent jet assembly made by Chicksan which will be lowered under the caisson to loosen up the material. The pipe will also contain an air lift pump to remove the loosened material.

This is a critical operation for the caisson must remain vertical. Should it lean it will be brought back into a vertical position by a carefully

planned sequence of jetting and pumping, or by manipulating the top anchor lines.

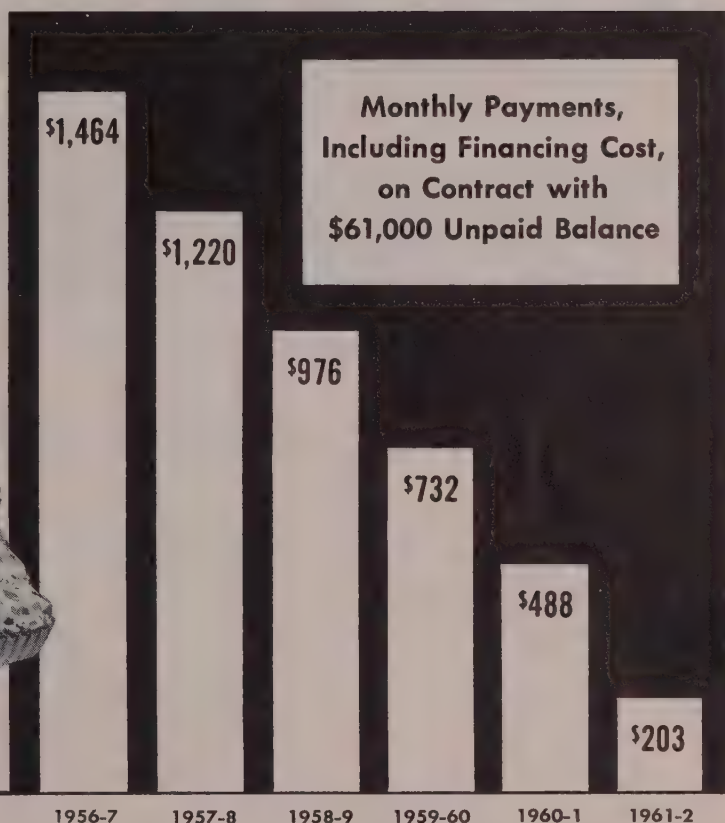
It would help the contractor very much to know how much material has been removed beneath each cell by the pumps and whether or not sloughing from the sides is taking place evenly. Cameras and TV will not work because the water will be too muddy. It might be possible to find the position of the soil by Sonar but so far nobody has devised a workable arrangement. Anyone with a plan to solve this difficulty is invited to contact the contractor at Post Office Box 518, Crockett, Calif. The last of the three caissons is expected to be completed by July 1957.

Personnel

Russell Cone is project manager for Mason and Hanger (many will remember him as resident engineer on the Golden Gate Bridge). L. L. Snedden is chief engineer and Ed Bowman is general superintendent. F. S. Rolandi, Jr., is assistant manager.

For the State of California L. C. Hollister is project engineer. Oscar A. Johnson is resident engineer assisted by Reid B. Neff and Wallace Ames.

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A new attack on the water conservation problem —

Underwater canal lining experiment

Bureau of Reclamation and manufacturers of asphalt pre-fab material carry out interesting and promising tests in placing panels in canal near Yuma, Ariz., without interrupting service.

By C. L. SWEET
Chief, Irrigation Operations
Bureau of Reclamation
Boulder City, Nevada

AREAS OF THE SOUTHWEST which have a year-round growing season represent a special problem in the delivery of irrigation supplies from unlined canals and ditches. Service is essential every month of the year, and the required shut-down period for unwatering and "dry-up" to permit installing a lining is hard to justify, when balanced against the saving in water. Several types of lining and lining procedures have been developed during the past few years, but none has been the answer to the question of getting the lining in place while the canal remained in service.

The Bureau of Reclamation has been working on this important problem for the past five years, experimenting with sedimentation, emulsified asphalt injection and other materials that might be used or applied to the wetted perimeter of operating canals. In some instances the results have been encouraging, and in others, frustrating.

About a year ago the Bureau's Region 3 office at Boulder City, Nev., working with the area engineer for The Asphalt Institute, Los Angeles, suggested the possibility of using prefabricated asphalt sheets or planks as a material which might, because of its flexibility and other characteristics, be assembled into panels, lowered into position under water and finally sealed with a special mastic.

This idea was submitted to the Bureau engineers in Denver, and to the Envoy Petroleum Co. of Long Beach and the Gulf Seal Corp. of Houston. The suggestion opened a new approach, but a number of unanswered questions arose. It was mutually agreed that the only way the questions could be answered was to actually try some procedures in the field.

The asphalt companies contributed material and skilled supervision; the Yuma County Water Users' Association, Yuma, Ariz., offered a site on its central main canal and contributed labor and equipment. Technical assistance was given by the Bureau, The Asphalt Institute and the Globe Engineering Co., of South Gate,

Relentless is the expression that applies to the fight to conserve the water resources of the Western states. A most serious type of loss results from the conveyance of irrigation supplies in unlined ditches. Irrigation economics justifies this cheapest method of delivery, but the high seepage losses can no longer be ignored, as the demands on our water supplies continue to grow.

Western Construction has presented many articles describing the various methods that have been developed to provide an asphaltic seal—either membrane or pre-fab form—to cut these losses. In each case the process involved unwatering the canal during the off-season. In the Southwest, with year-round growing seasons, the problem is more complicated. Now comes the first serious attempt to install a water-tight membrane while a canal remained in service. Although only partially successful, it represents an important field experiment.

Editor



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When extra reach is needed, inserts are quickly added to butt-connected boom. There's 30 to 100 feet of main boom, plus 15 to 30-foot jib. What's more, it handles maximum 130-foot boom and jib with low A-frame. Here are some of the other advantages you get with this big-capacity Koehring 305 excavator.

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25-ton truck crane —
(100-ft. main boom plus 30-ft. jib raised with low A-frame).

15-ton crawler crane —
(80-ft. main boom plus 20-ft. jib raised with low A-frame).

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Crawler-mounted 305 is available on standard, or extra-long, extra-wide crawlers to suit all operating conditions.



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PLACING (above) was done by pulling the barge across the canal, allowing the asphalt panel to sink and conform to the slope and bottom of the canal. At first some difficulty was experienced with the panels tending to float or porpoise with the current. Note the mastic applied to the ends of the panel. This was intended to bond to the end of the opposite panel, when it was placed by the reverse procedure from the opposite bank.



IMPROVEMENT (left) in the placing process was the use of weighted rollers in the second test to move the panel down through the flowing water and help it conform to the side and bottom of the canal.

Calif. It was an experiment in procedures and methods and not a demonstration of lining materials.

Representatives of the Envoy Petroleum Co. assisted the Water Users' Association in building a small barge, and on Jan. 11, 1956, representatives of the cooperators met and proceeded according to a pre-arranged schedule. The canal was about 30 ft. wide at the water surface, about 3.5 ft. in depth, and on the morning of the test the stream velocity was about 1 ft. per sec.

Two different methods

Two basic methods for assembly and placement had been proposed, which were designated stern-lay and side-lay, using a raft anchored in the canal. The first question was the effect of water velocity on the placement procedure. Both methods were based upon individual ideas to meet the velocity problem.

The stern-lay method using continuous fabrication was the first to be tried. After several hours it was

apparent that it was not possible to make the assembled sheets or planks conform to the trapezoidal ditch section. Stream velocity was also proving to be a problem even at the low velocity maintained for the experiment.

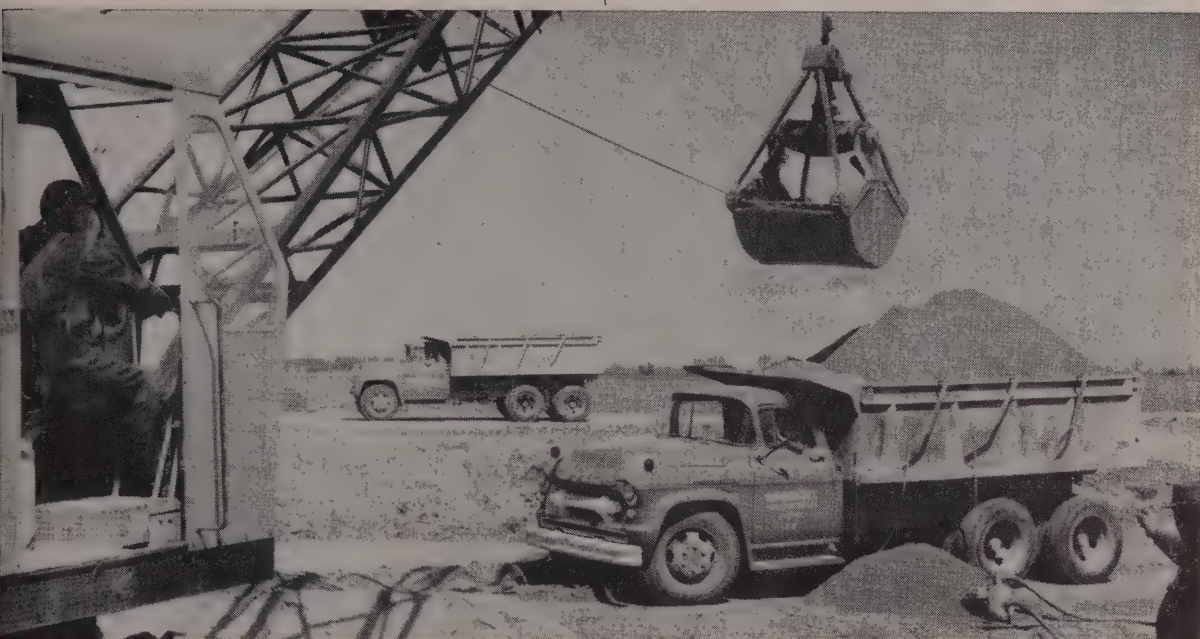
The side-lay method consists of fabricating a panel of asphalt sheets starting from the top of the canal bank, down the slope and out onto the barge. The first panel, composed of only three strips of asphalt plank, is shown being assembled in the photograph. Subsequent panels were all composed of either five or six sheets, depending upon the width of the material. Following fabrication of the panel, the barge was pulled laterally across the canal and out from under the panel.

A similar operation from the opposite bank left a lapped center joint which was expected to form a seal when lapped over the mastic along the outer edge of the first panel. Some difficulty was experienced in sinking the panels with floating or porpoise type action caused by the

current. This was minimized in the second test by use of weighted rollers (see picture). During the January 11 trial two types of mastic and high-melt asphalt were used as joint sealer and several methods of application were tried.

Inspecting first results

Following the demonstration the canal was unwatered and inspected with results shown on the following page. The section of material placed by the stern-lay method had a large upstream bulge at the low water line, evidence of the failure of this method to place the material so as to conform to the canal section. Joint material for one panel was high-melt asphalt and Type B mastic, and all transverse joints of this panel down to water line shown appear effective and satisfactory. Joint material for another panel was a combination of the high-melt for fabrication on the barge and Type A mastic for the underwater seal. In this case the high-melt was also effective and satisfactory, but the Type A mastic, which was standard material usually used on regular construction, failed completely to seal under water. So far as could be determined the longitudinal seal had also failed to join the two sections.



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mud sucked them down on their axles . . . sometimes two-thirds of the wheels were actually buried . . . those trucks were literally crawling on their bellies. But they kept rolling. And, to my amazement, we didn't even have to lighten the nine-ton loads!

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RESULTS were observed critically when the canal was unwatered. Near the footbridge can be seen the section that was placed by the end-lay process and the bulge at the low water line which indicated the failure

of this method to place material so that it would conform to the canal section. The remaining panels were all placed by the side-lay method. The sacks of sand were used as aids in sinking the panels into position.

A second demonstration

Recognizing that water depth and velocities had been most favorable on January 11, arrangements were made for a second demonstration on February 15 before the Arizona Irrigation Districts' Association. It was recognized that the problem of sealing the longitudinal joint could not be solved in a few weeks, but it was desired to submit the installation technique to a more rigorous test.

On the day of the second demonstration the canal was flowing about 3 ft. per sec. and had a depth of about 4.5 feet. Using the same basic methods but with techniques improved by the former experiment, it was possible to place four 20 x 23-ft. panels during the five hours of the demonstration. Only one panel gave any trouble because of the increased velocity of the water. The mastic used on February 15 was presumably the same as Type B used on January 11 except for an admixture to increase its flow characteristics for use in an air-driven pump.

Inspections on February 20 with water out of the canal showed that the mastic had bonded on all the lateral joints and the seal was satisfactory. Subsequent inspections discovered that chemical action, apparently from the additive, had continued until all adhesive qualities of the mastic were gone and inert material remained. However, the Type B mastic as used on January 11 still retained its adhesive and plastic qualities.

As a result of this experience, the Bureau's laboratories at Denver plan to analyze the several types of mastic, ascertain the cause of deterioration of the mastic used February 15, and develop specifications for use in this type of construction.

The conclusions to this point were:

1. The 1/2-in. prefabricated asphalt sheets were strong enough to with-

stand rough handling and made a very satisfactory material for fabrication of flexible panels.

2. The high-melt asphalt made an inexpensive but very rugged and efficient joint material for panel fabrication.

3. Panels can be launched in velocities up to 3 ft. per sec. and sunk to the bottom perimeter of a canal without use of costly methods or equipment.

4. Three types of mastic were used in the demonstrations. Type A was the standard mastic used in normal construction. It proved to be too stiff for easy application and failed to have sufficient adhesive qualities to produce a bonded joint. Type B developed for this test was easily applied by hand but was too stiff at comparatively low temperatures to use in an air-driven pump. The bond formed by this material was satisfactory both above and below the water line. Type C with the additive worked well with the air-driven pump, bonded and sealed initially, but disintegrated over a period of weeks to an inert mass.

5. For a lining to be effective it must be virtually watertight. To obtain such a lining by the above-described procedure requires a watertight longitudinal joint. Following the two demonstrations it was acknowledged that the center joint was a failure, and was the one big problem to be worked out.

6. Although no effort was made to determine installation costs, it appeared that construction costs would not greatly exceed normal installation costs if an inexpensive method is worked out for the longitudinal underwater joint.

Longitudinal joint problem

Search was started for a Paul Bunyan type of sewing machine that would stitch the two panels together under water, without the benefit of a

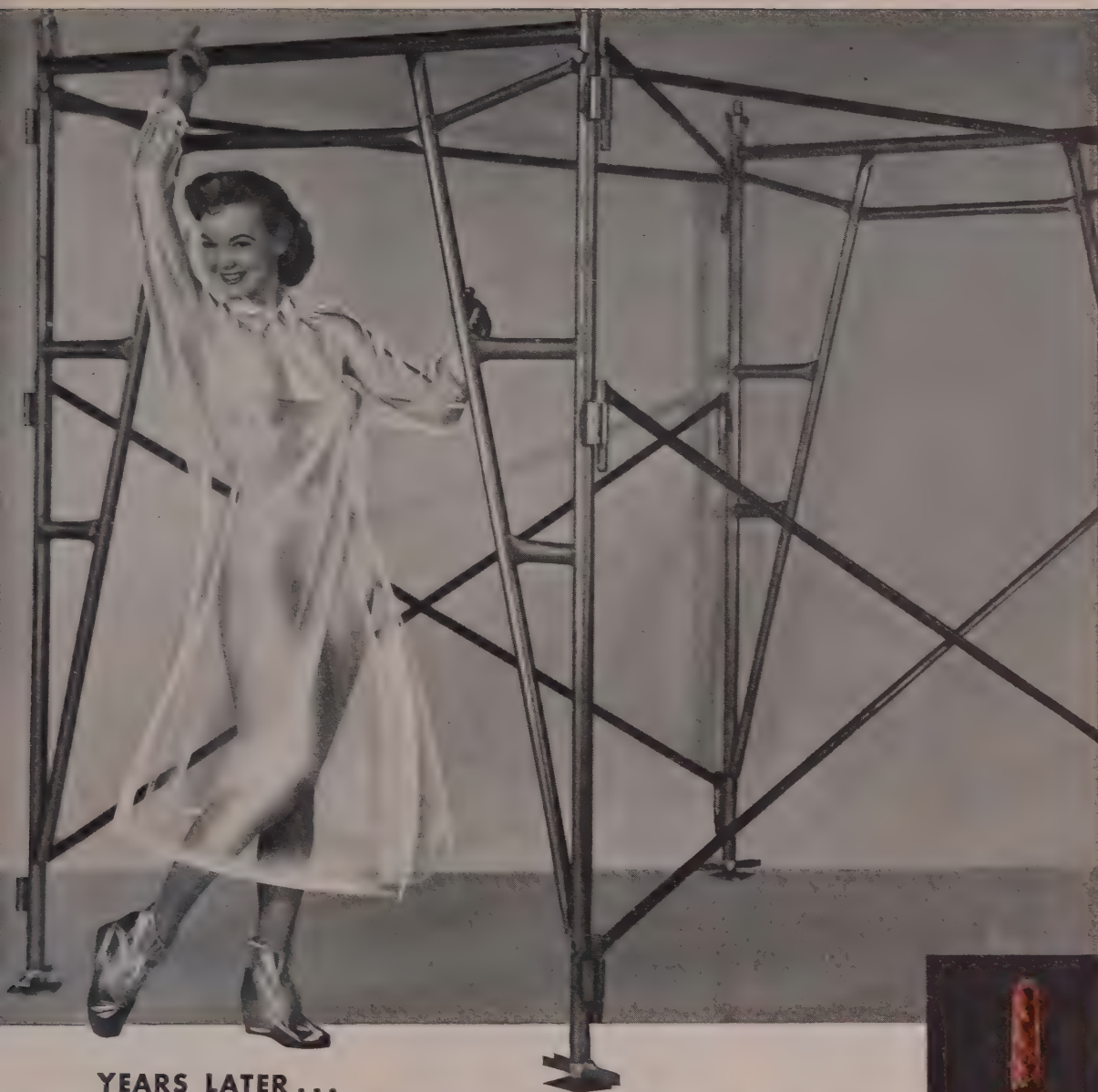
solid support under the bottom panel. The machines used by industry to staple fiber-board cartons without using a stapling anvil on the interior of the box were a possible clue. The problem was outlined to representatives of the Bostitch Corp. They advised that Bostitch made a large air-driven stapler for the building trade which would require but minor modification to be the tool that was needed.

The two thicknesses of 1/2-in. lining plus a 1/4-in. layer of mastic would require a special staple which the company would have to design and manufacture. The group was assured there was no technical problem involved in design and development costs must either be underwritten or a sufficient market assured to warrant such expenditures by the company. The Bureau is hopeful that some arrangement can be worked out with the fastener industry to develop a stapler and machine for a field demonstration.

This research and experimentation is not involved with the old arguments over types of linings or material. Regardless of any limitations attributed to prefabricated asphalt sheet lining, it is the only material found so far that offers any possibility of being installed under water in an operating canal or reservoir to provide a positive lining.

Much work remains

Development work remains to be done particularly in finding a fully satisfactory adhesive and fastening process. If such work proves successful, construction procedures would then have to be worked out through field pilot operations. The Bureau of Reclamation is hopeful, but by no means certain, that lining of canals and laterals while in service may have been advanced toward solution. If successful, this will add another useful tool for the conservation of the natural resources of the arid West.



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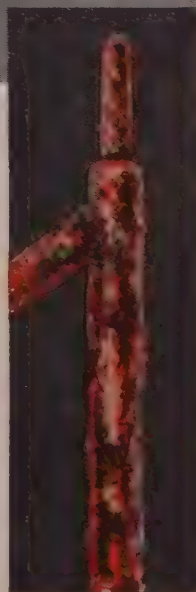
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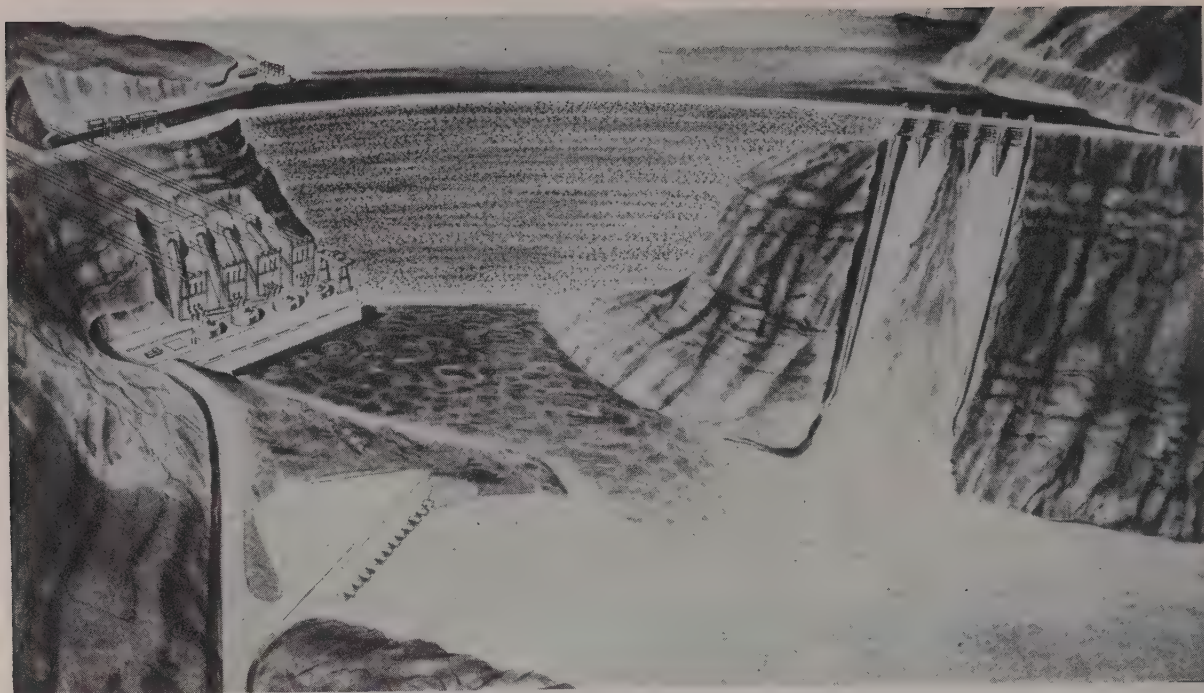


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River diversion next at Brownlee

Diversion tunnel is ready, cofferdams are nearly complete as Morrison-Knudsen Co. prepares to change the course of the Snake River in Hells Canyon. When finished Brownlee Dam will be 395 ft. high, one of the largest rock-fill structures in the world.

IN THE RUGGED HELLS CANYON area between Idaho and Oregon crews of Morrison-Knudsen are building two rock cofferdams across the turbulent Snake River. Before the month of August is over closure will be made and the river will be forced to follow a new course—a 2,555-ft. long, 38-ft. diameter diversion tunnel. This will permit M-K to go to work in the streambed and Brownlee Dam will begin to rise. By the end of 1958 the crest of the structure will be 395 ft. above its foundations, making Brownlee one of the highest rock-fill dams in the world.

This is the first of three dams which will be built along this section of the Snake River. Preliminary work has started 12 miles downstream at the site of Oxbow. The last to be built will be the Hells Canyon Dam, the second largest of the three and the farthest downstream. The structures are being built by the Idaho Power

Company under a license from the Federal Power Commission.

A word of history

For many years the political weather surrounding dam construction in Hells Canyon has ranged from cloudy to stormy. But in July of this year there were definite signs of clearing skies. On July 19 the U. S. Senate defeated a bill presented by advocates of public power to build a single high federal dam in Hells Canyon. The 700-ft. high dam would flood out the three Idaho Power sites.

The Senate turned down the proposal by a roll-call vote of 51 to 41 defeating the project for this session of Congress and perhaps permanently.

The biggest remaining barriers to the three low dams is court action. For instance, the U. S. Appeals Court for the District of Columbia now has before it an appeal by public power backers to nullify the Federal Power Commission license to Idaho Power.

But it seems unlikely, in view of the recent Senate action, that the FPC license would be revoked.

Work starts at the site

Morrison-Knudsen agreed to build Brownlee and Oxbow last November for \$87,000,000. The day after the contract was signed M-K began moving equipment to the site and improving and constructing access roads. There is now about \$4,000,000 worth of construction machinery on the job. The biggest access job was the construction of six miles on the route from Cambridge to the site. At one point a fill 120 ft. high containing 180,000 cu. yd. was necessary. The road was built for about \$55,000 per mile. Still in the planning stages is the improving of 24 miles of existing road to Cambridge.

To take advantage of a railhead a few miles away on the Oregon side of the river M-K built a bridge which will remain as a traffic facility when the job is over. It is 600 ft. long and was built with H-piles with a load capacity of 187 tons to accommodate the Manitowoc crane. Even this bridge was involved in politics when it was contended that Idaho Power had exceeded its authority by proceeding without permission from the Corps of Engineers. Later the Corps gave its approval.

The contractor has built an excellent work camp at the site. Using about 80,000 cu yd. of spoil from



Model 543. No machine or method can equal the low cost loading of this Barber-Greene loader. High travel speed, high capacity and finger tip discharge control save job time, man time, truck time.

Cut loading costs the continuous way

In a Massachusetts sand and gravel pit, a Barber-Greene Model 543 Bucket Loader handles 900 tons of $\frac{3}{4}$ " stone every day—easily tops all other methods in truck loading operations.

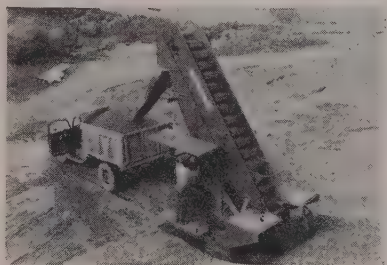
The 543 is ideal for the all-day-long loading operations of one truck after another because its continuous flow maintains maximum capacity re-

gardless of the skill or zeal of the operator.

Its simple operation makes it easy for drivers to load their own trucks. A hydraulically controlled swivel conveyor has the reach to load highest and longest trucks and trim the load to full capacity every time. And this versatile loader can be easily converted into a coal, snow or leaf loader.



Model 550 removes windrows in a hurry... with a capacity that keeps ahead of all trucks normally available. This light, highly maneuverable machine reduces windrow loading to lowest cost. Self-propelled at 10 m.p.h., with a turning radius of 8' 6".



Model 82A moves 1200 yards in 8 hours. That's the record of a Barber-Greene in a New York building and supply yard. Handles sand, stone, coal and other materials at high capacities. Easy operation permits driver to load his own truck.



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TUNNEL DRILLING JUMBO was designed by Woody Williams, head of M-K's Dam Division. It carries 14 Joy drifters and is built around a 17-yd. Euclid tractor and frame. This gave the rig good mobility, enabled it to move quickly from one heading to another. Tunnel meeting was remarkably smooth, with no visible rock rib. Top photo shows jumbo under construction.



DRIVING CONDITIONS were good but about 400 ft. of the 38-ft. diameter horseshoe had to be lined with concrete. Steel ribs were positioned from the drilling jumbo, panels moved ahead with a truck crane. Concrete at top of arch was placed by Pumpcrete.

the outlet portal of the diversion tunnel a series of benches was built on the sloping Idaho bank of the river. On these broad level steps about 20 major buildings have been constructed. In addition to well-equipped machine shops and warehouses, there are three 80-man barracks and two 30-man barracks, with mess hall seating capacity for 260. All the buildings were designed and built by M-K and most of them are 4 ft. modular. The dormitory, mess hall, and offices have air cooling which keeps the temperature in the middle 70s. The outside temperature in this section of the country gets up around 120 deg. during the summer.

Diversion tunnel

The diversion tunnel is a 38-ft. standard horseshoe and was driven through 3 tilted layers of basalt. Driving conditions for the most part were good but about 400 ft. had to be shored. This section is now being lined with an 18 to 24-in. concrete lining. Steel ribs are put up with the drilling jumbo and then she-bolts are welded to the ribs to support the radius panels. The panels are moved ahead with a Lorain truck crane. Concrete was poured from a concrete bucket handled by the crane except for the highest part of the arch which was handled by pumpcreting. This last operation is now being finished.

The jumbo, designed by Woody Williams, who heads up M-K's dam division, is mounted on a 17-yd. Euclid tractor and frame. Part of this rig was built in M-K's main yard in Boise. The jumbo mounts 14 Joy drifters on 3 decks. Three of the drifters are mounted below the third deck for handling the lifter holes.

The novel part about the tunnel driving technique was that the jumbo and the Northwest 80D electric shovel worked on both faces concurrently. While the jumbo was drilling at one face the shovel was mucking at the other. When the jobs were through they would switch faces by using a level road along the river. The steepest grade the machines had to negotiate was about 10%. The routine settled down to two 8-hr. shifts for drilling and three 8-hr. shifts for mucking. Three Euclid end-dumps handled the muck moving. Four Joy coaxial fans and two Roots-Connerville blowers were used for ventilation. Compressed air was supplied from a stationary plant utilizing three Ingersoll-Rand XLE stationary compressors capable of supplying 1,150 cfm. each.

On the average, the crews pulled about 14 ft. on a shot. About 20 lb. of powder were required per cu. yd. (neat). There was from 1/2 to 1 ft. of overbreak.

Tunnel holed through

The tunnel was holed out in June with a 23-ft. round. The closure was remarkable in that the final blast left

CARBIDE INSERT? or MULTI-USE?



LOCATION: Spaulding Turnpike project, Route 16, Dover, N. H.
OPERATION CONDITIONS: Medium granite.

W. H. HINMAN, INC., speeds drilling, reduces bit changes on Spaulding Turnpike with TIMKEN® DC and KC carbide insert bits

DRILLING through medium granite on New Hampshire's Spaulding Turnpike project, W. H. Hinman, Inc., increased drilling speed and reduced bit changes by using Timken® DC and KC carbide insert bits.

Timken carbide insert bits give you the highest speed through hard, abrasive ground. They're most economical for constant-gauge holes, small-diameter holes, and extremely deep holes.

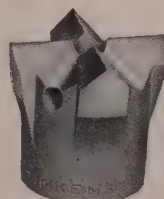
But Timken carbide insert bits may not provide the best solution to *all* your drilling problems. For instance, in drilling ordinary ground, Timken multi-use bits are most economical. With correct and controlled reconditioning, they give the lowest cost per foot of hole when full increments of steel can be drilled.

Both Timken multi-use and carbide insert bits are made from electric furnace, Timken fine alloy steel. So you can count on them to last longer. And, because of the shoulder union developed by the Timken Company, threads are not subjected to drilling impact.

Many different Timken carbide insert and multi-use bits are interchangeable in the same thread series.

Drillers can change bit types quickly and easily as the ground changes—right on the job!

To find out which Timken bit type is best for *your* needs, call or write the Timken Rock Bit Engineering Service, The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".



Timken threaded multi-use rock bit



Timken threaded carbide insert rock bit

*your best bet
for the best bit
...for every job*

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.



CONSTRUCTION CAMP is on Idaho side of the river built on broad steps made of spoil from the tunnel. There are 20 major buildings, with air-cooling for the bunkhouses, mess hall, and offices. Access bridge at lower left was also built by M-K.



A BUCYRUS-ERIE 71-B, 3-cu. yd. shovel loads one of a fleet of Euclids. The shovel is powered by a Detroit Diesel 6-110 engine with torque converter and tail shaft governor.



MODEL OF BROWNLEE on a scale of 1 to 70 is being studied in the hydraulics lab of the State College of Washington to determine best spillway design. Shown is a test of a flip bucket spillway. The model includes a scale replica of the streambed $\frac{3}{4}$ of a mile above and below the dam. Dr. E. Roy Tinney is in charge of the laboratory, which also is carrying out tests on a model of Noxon Rapids Dam in Montana.

absolutely no visible rock rib at the meeting point of the two headings. This was especially gratifying to the contractor since he handled all his own engineering.

Material for the dam will come from excavations for structures at the site. Clay for the impervious core and filter material will come from 3 miles upstream. A road to this borrow area is now under construction. All the access roads were contract items.

Source of aggregate

Aggregate for the concrete needed on the job is coming from an area near the Oxbow site, where the crushing and screening is done. The main units here are a 54-in. Wemco sand classifier, a Universal jaw crusher, a Symons shorthead cone crusher, and a Jeffries 30 by 84-in. open pan feeder. Doing the hauling are 5 Kenworth tractors with Omaha standard trailers.

Because of a shortage of space at the Brownlee site the batch plant is being constructed on a fill which was built out from the Idaho bank. It is essentially a Noble plant with three Koehring 2-cu. yd. mixers.

Two cofferdams

There will be two main cofferdams (now under construction) and one smaller protective cofferdam which will be within the upstream toe of the dam. The main upstream cofferdam will be 35 ft. above streambed, the downstream one 25 ft. above streambed. They are being constructed of shot rock with the maximum sizes around 2 or 3 ft. Closure is slated for August. The cofferdams must withstand a normal stream flow of 15,000 sec. ft. and a flood maximum of about 58,000 sec. ft.

The excavation for grouting in the cut-off trench under the clay core will amount to about 300,000 yd. It will go about 100 ft. below streambed and will be kept to whatever slope is necessary.

The fish handling facilities which are being placed in the diversion tunnel outlet channel will utilize an electrically charged barrier, developed after extensive research by the U. S. Fish and Wildlife Service. The barrier will deflect the fish into concrete tanks built on the downstream side of the tunnel outlet channel. The fish will be picked up from the fish hopper and loaded into tank trucks and carried upstream and dumped back into the river.

For Morrison-Knudsen, Glenn C. Johnson is resident manager and Martin E. Broan is construction manager. Russ Martin is project engineer. Gomer Condit is resident engineer for Idaho Power Company.

A complete list of personnel, including pictures, a complete equipment list and dimensions and quantities for the dam were presented on page 94 and 98 of the July issue of *Western Construction*.

Kelly Ball slump test

—A progress report on its use

By

BAILEY TREMPER

Supervising Materials and Research Engineer
California Division of Highways

SIX YEARS have elapsed since Prof. J. W. Kelly of the University of California at Berkeley first announced that the depth of penetration of a metal sphere into fresh concrete provides a good index of its consistency. The design of the instrument proposed by Professor Kelly was described in *Western Construction*, July 1953.

Essentially the so-called "ball" consists of a solid steel cylinder 6 in. in diameter with the bottom surface shaped in the form of a hemisphere of 3-in. radius. A graduated handle about 10 in. long is attached to the top of the ball at the center and a stirrup is provided which slides freely on the handle. The height of the ball proper is about 4½ in. but is adjusted as necessary to bring the weight of ball and handle, exclusive of the stirrup, to 30 lb. The stirrup has a span of 12 in. and is bent downward and then inward to form a small foot at each end. The relative positions of handle and stirrup are adjusted so that when the handle is upright and the ball is resting on a flat surface, the top of the stirrup coincides with the zero mark on the handle.

In operation, the instrument is placed on a leveled surface of fresh concrete. The light-weight stirrup does not sink appreciably but the ball penetrates to a depth that depends on the consistency of the concrete. Depth of penetration is read on the graduated handle. Three or more readings should be taken from a batch or location with about a 6-in. shift in positions.

Penetration of the ball multiplied by two is approximately equal to the slump as determined by the standard cone test. The relationship is not exact and varies somewhat with the character and grading of the aggregate and richness of mix. Deviations from the 2:1 ratio are not great in most concrete. Furthermore the Kelly Ball penetration probably furnishes an index of consistency that is fully as significant as that of the cone test.

The ASTM Tentative Method of Test for Ball Penetration in Fresh Concrete requires that the result shall be reported in inches of penetration. Since most engineers are accustomed to visualizing consistency in terms of inches of slump, the use of units one-half as great to denote the same consistency may be confusing. Some engineers prefer to multi-

ply the observed penetration by two and report it as "Kelly Ball slump." The California Division of Highways, for example, graduates its instruments to read Kelly Ball slump equivalent directly. To avoid possible quibbling over intent, its Standard Specifications refer to consistency only in terms of Kelly Ball "slump."

For field use, the ball should be made of corrosion resistant metal to avoid the possibility of pitting or other loss of smoothness. Balls have been constructed of materials such as cast iron, mild steel or stainless steel. Except when made of the latter material, a coating of zinc, cadmium or chromium is a distinct advantage in assuring long life.

The foot at each end of the stirrup as designed by Professor Kelly has an area of about 2 sq. in. Some engineers believe that the area should not be less than 9 sq. in. The tentative ASTM standard requires such a foot. To the writer, the need of a large foot is largely theoretical and it complicates the packing and transportation of the instrument in a manner to avoid distortion of the stirrup.

The rapidity with which tests for consistency can be made and repeated has brought popularity to the Kelly Ball. The test can be made in a wheelbarrow, buggy or other container of sufficient volume or it can be made after concrete is deposited on the subgrade or in the forms.

In general, the distance from the center of the ball to the free edge boundary of the concrete should not be less than 9 in. and the depth of the concrete not less than 8 in. When the concrete is relatively stiff or the aggregate is small, these dimensions may be reduced somewhat without noticeable effect. A rule frequently followed is that the depth of concrete shall be such that the clearance under the ball after penetration is not less than twice the maximum size of aggregate.

Concrete should be tested as it comes from the mixer without vibration or tamping. The surface should be smoothed over an area about 12 in. square with a minimum amount of screeding. The illustration shows a test of paving concrete of 2-in. slump. In this case the ball has penetrated 1 in. but the graduations indicate 2 in., Kelly Ball slump.

Occasionally cements develop false set and cause the concrete to stiffen perceptibly shortly after it is discharged from the mixer. This stiffening may take place while a slump test is being made by the cone method. In this event the slump as determined is lower than that of the con-



crete as it leaves the mixer. If more mixing water is added to overcome the premature stiffening the quality of the concrete is impaired. If the slump test is used as a control of quality it should be made promptly after the concrete is discharged. This can be done with the Kelly Ball and consistency tests by this method have a decided advantage in this respect over the cone method.

Concrete showing premature stiffening arising from the use of cement with false set characteristics can be restored to its original consistency by additional working and without the use of more water. This condition is troublesome but can be overcome without impairment of the quality of concrete. There are all degrees of false set and mild cases may not be recognized. Prompt testing for slump with the Kelly Ball makes it possible to assure that the concrete is not mixed with more water than it should be.

It should be noted in this connection that ready-mixed concrete rarely displays premature stiffening after discharge because the period of time in the mixer or agitator usually is sufficient to overcome any stiffening effect that might have occurred after a shorter mixing period.

In summary, it may be said that the Kelly Ball method provides a rapid test for consistency with a minimum use of apparatus that requires cleaning between tests. The instrument should be manufactured and maintained with care. A few simple precautions are required in testing but none demands exceptional technical skill. Because the test can be completed in short time it permits a determination of slump promptly after discharge from the mixer and thus provides a control of quality not previously available.

TS-18

"Eucs"

**TWIN-POWER SCRAPERS get
more work done...faster**



Twin-Power—two engines driving separate axles—was pioneered by Euclid 10 years ago. Torque converters and semi-automatic transmissions assure easy operation and a smooth flow of power matched to any job condition. The TS-18 is powered by two 218 h.p. engines with a 300 h.p. engine for the tractor available for work where maximum power can be used. Standard tires are 27.00 x 33 with 33.5 x 33 as optional. Harris Construction Company's "Twins" are TS-18 Specials with 518 h.p. and the larger tires.



With a total of 518 h.p.—300 h.p. in the tractor and 218 h.p. in the scraper—Harris' TS-18 Specials really made the dirt fly and completed the Glasgow Air Force Base grading weeks ahead of schedule.

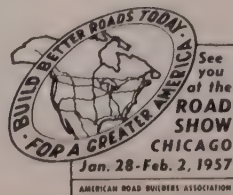
Harris Construction Co. of Aberdeen, S. D. recently set a new record for earthmoving on Montana highway work with a fleet of six TS-18 Euclid Scrapers. In a six-day work week these "Eucs" moved 90,000 cu. yds. on a half million yd. road contract near Nashua on Route 2. They worked 10 hours a day—self loaded gravel, clay and shale without pusher tractors—on hauls averaging 1500 ft. Most of the time each machine worked alone making shallow cuts and fills on sections of the 13-mile job.

At nearby Glasgow Air Force Base, Harris used his original fleet of four TS-18 "Eucs" to move most of the 1,200,000 yds. of gumbo. Working two 10-hour shifts 6 days a week, each scraper averaged 69,000 yds. a month. Performance of the "Twins" on this air base job was so outstanding that 2 more were added to the Euclid fleet—and Harris has disposed of 8 other scrapers and 5 crawler tractors.

With two jobs only 26 miles apart the mobility and independence of the TS-18 Scrapers proved a big advantage. They moved from air base to road job and back again—as conditions required—in about an hour. There was no problem or expense in moving pusher tractors because none were needed at either job. And when a few loads of sand or gravel were needed for culverts or other use, a "Twin" or two took off for the nearest pit and did the job in a hurry.

Owner Ken Harris has found the Twin-Power Scraper the most efficient dirt mover he's ever used. His fleet with job availability of 95% has more than lived up to his expectations in production and low cost yardage. That's why he tells visitors to his jobs, "When I buy additional haulage equipment it'll be TS-18 'Eucs'".

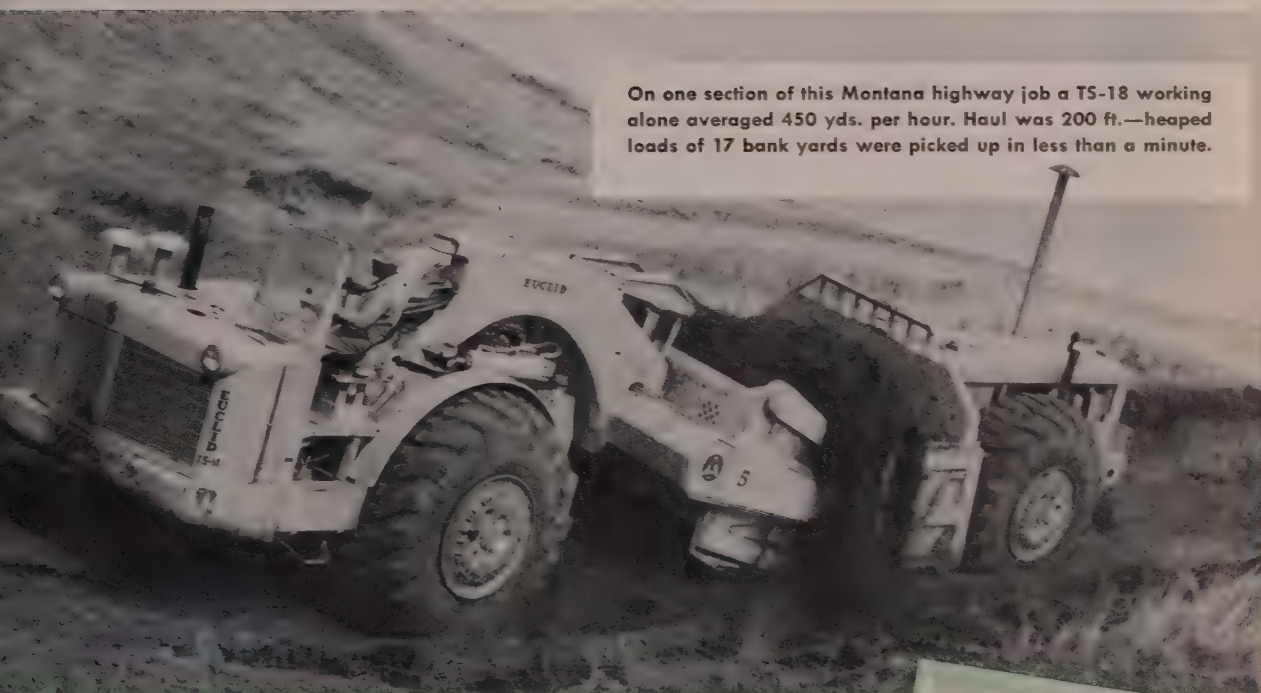
For information on the complete line of Euclid earthmoving equipment, call your Euclid dealer—he can show you why *Euclids are your best investment.*



t new earthmoving records

... complete tough jobs way ahead of schedule

On one section of this Montana highway job a TS-18 working alone averaged 450 yds. per hour. Haul was 200 ft.—heaped loads of 17 bank yards were picked up in less than a minute.



The 33.5 x 33 tires and NoSpin differentials of the TS-18 Specials provided the tremendous traction needed for self-loading the heavy gumbo and gravel and made efficient use of the 518 total h.p. on both of the Montana jobs.

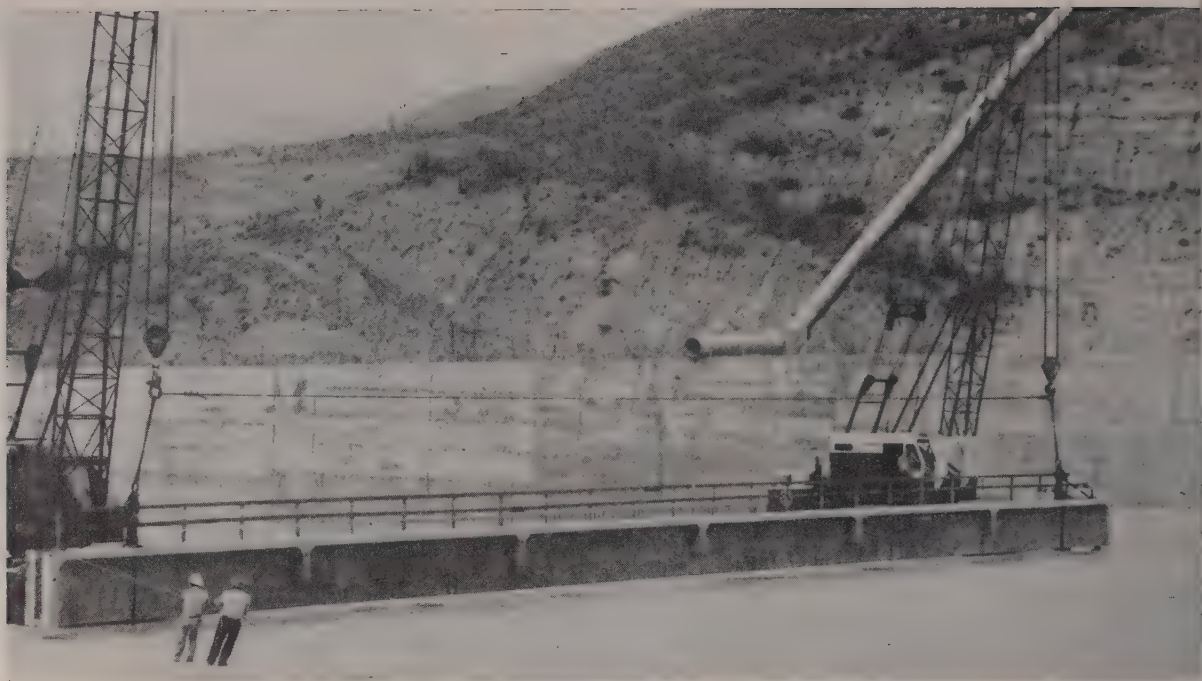
Ken Harris, head of Harris Construction Co. in South Dakota, says "the complete independence of the 'Twin' is revolutionizing road building on many jobs where concentration of equipment in any single cut is not practical." He's standardized on the TS-18 Special for his earthmoving equipment.



Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE





Record for post-tensioned girders

Span of 122 ft. with T-section members 4 ft. 9 in. deep crosses spillway of Santa Felicia Dam. Cast and stressed on the spillway floor, the members weighed 38 tons and were lifted 60 ft. to position.

THE FEASIBILITY OF PRECASTING and the advantages of prestressing are well demonstrated in a bridge structure just built as part of a dam project in Southern California. Composed of full-length precast-prestressed T-section members, the 122-ft. middle span of this bridge is believed to be of record length for its type. With approach spans of 31 and 51 ft., deck width of 12 ft., piers and abutments built to carry a future equal additional width of deck, the contract price for the construction was \$40,000.

Included in the contract was the extension of piers and abutments previously built, together with the construction of rails and fencing, all of which amounted to \$12,500. The bridge deck itself, therefore, cost only \$27,500, or about \$11.24 per sq. ft. of overall area, providing a curbed 10-ft. 6-in. traffic lane. The work was carried out successfully in spite of difficult conditions of site and access, heavy rains and other complications.

The bridge and its design

The bridge carries a service roadway over the spillway of the Santa Felicia Dam. This dam creates a water storage reservoir on Piru

Creek near Fillmore for the United Water Conservation District. Designed for H-15 loading, the main span of the bridge rests on piers back of the spillway walls and clears the spillway floor by about 60 ft.

Each span is made up of four T-sections having a flange width of 3 ft., top slab thickness of 5 in. and web thickness of 6 in. Depth of the members in the long span is 4 ft. 9 in. and in the short spans 2 ft. 10 in. This resulted in T-sections weighing approximately 7½ tons each for the 31-ft. span, 13 tons each for the 51-ft. span, and 38 tons each for the 122-ft. span.

Precasting and prestressing

Site conditions led to the decision to fabricate the elements for the approach spans at the contractor's yard in Bakersfield and to transport them to the work by truck. The long-span units were cast on the spillway floor, upstream from the bridge site.

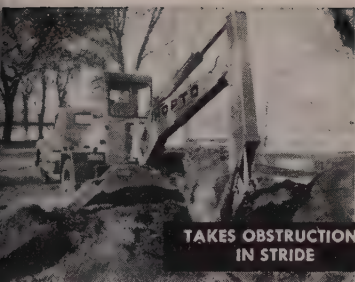
Required concrete compressive strength of 5,000 psi. at 28 days was exceeded in operations both at the yard and at the bridge site. The required strength of 4,000 psi. at transfer of stress was easily met at ages of 7 to 12 days. Pretensioned straight

wire strands were used in the short yard-cast members and draped cables placed in tubes were used in the long members cast at the site and stressed by post tensioning. Wire strands were anchored by bond, while cables were grouted and provided with positive end anchorage.

The ¾-in. strands of 7 wires and the cables of twelve ¼-in. wires were made up of stress-relieved wire of a quality permitting the use of a working stress of 127,000 psi. Each member of the 31-ft. span required 14 strands, while 22 were used in the 51-ft. span. The long-span members made at the job required 7 cables each.

Construction procedures

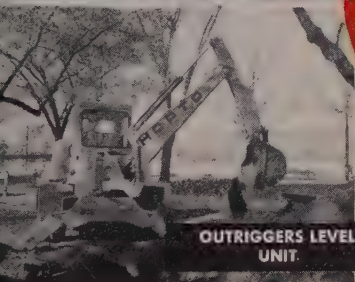
The short-span sections, weighing 7½ and 13 tons, were trucked to the bridge site and erected side by side on prepared pier and abutment bearings, using a single 35-ton crane. Erection of the long center-span members presented more of a problem because of their weight, the necessity for "walking" them some distance over the sloping spillway floor. They also had a tendency to overturn caused by the high center of gravity of the T-sections. It was necessary to employ two 35-ton cranes and to install "stiff-legs" at the pickup points in order to exert the lifting force at a point high enough to insure against the turning over and damaging of the members. Pipe sections 20 in. high bolted to the members accomplished the purpose.



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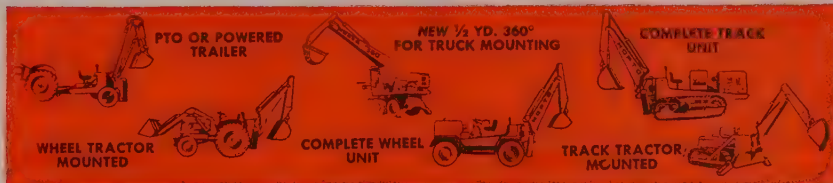
**completely
hydraulic**

Here's the fast cycling, 200° swing, *completely hydraulic* digger-shovel-crane that reaches out for work! HOPTO has a 16½' reach at ground level *beyond* the boom mounting; digs more than 11' deep and dumps at 9½' with backhoe and 11' with shovel bucket! It's the easy-to-operate unit your handy man will handle like a veteran in half a day!

HOPTO mounts on *any* ton-and-a-half or larger truck. Hydraulic outriggers level unit and take load from truck chassis and springing mechanism! Feather-touch controls in the full visibility cab actuate every movement of unit *and* outriggers. No belts, pulleys, cables or sheaves on a HOPTO! It's *completely hydraulic*!

The 1500 PSI hydraulic system has overload relief valves, double wire braided hoses, 5" inside diameter hydraulic cylinders with 2¾" chrome plated piston rods, and a large oil reservoir for most efficient operation! Self aligning bearings and hardened alloy steel pins . . . formed steel plate boom, stick, and sub-frame . . . direct mounting of pump on power unit . . . crowd cylinder *above* boom . . . these are but a few of the many *long-life, low-maintenance* features of the quarter-yard, work hungry HOPTO.

Write for complete information on the model or models for your requirements



MANUFACTURERS OF A COMPLETE LINE OF ½ YARD AND ¼ YARD HYDRAULIC DIGGER—SHOVEL—CRANE

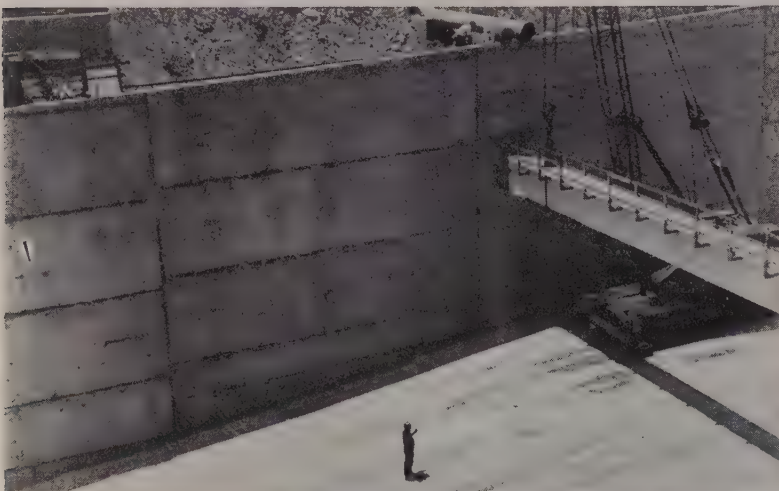
BADGER MACHINE COMPANY

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CROSSING the spillway of the Santa Felicia Dam, this single-lane bridge of 31, 51 and 122-ft. spans cost only \$11.24 per sq. ft. for the

deck itself. The piers were built to provide for adding another lane at a later date. Bridge is 60 ft. above spillway floor.



MAIN-SPAN members were "walked" down the spillway by two 35-ton cranes, then lifted above the spillway wall and placed on the piers. Because of their 122-ft. length these units were cast on the floor of the spillway, but the shorter members in the two side spans were cast in the contractor's yard and trucked to the site.



CAST on the spillway floor, these 38-ton members were post-tensioned with seven cables consisting of twelve $\frac{1}{4}$ -in. wires which permitted use of a working stress of 127,000 psi.

It was then necessary to move the members with care along the spillway and to lift them about 70 ft. to place them in position.

The final step, the integration of the deck members into a complete structure, was accomplished by post-tensioning the deck transversely at diaphragms installed symmetrically at span ends and at intervals of 15 ft. 6 in. in the 31-ft. span, 17 ft. in the 51-ft. span and 20 ft. 4 in. in the 122-ft. span. In each such diaphragm the stressing element was one $\frac{7}{8}$ -in. high tensile steel rod having an allowable working stress of 85,000 psi. and with standard threaded end anchorage.

Economy and personnel

The United Water Conservation District, in this instance, allowed contractors a choice of structural types in submitting their proposals, and with gratifying results. While comparisons on so limited a scope are far from conclusive, it is significant that the contract price for this bridge was \$14,000 lower than the proposal of the second bidder, which was for a steel type structure.

Howard Hays of Bakersfield was contractor for the bridge project, with A. W. Douglas, superintendent, and R. R. LeVitt, advisor on rigging.

Western Concrete Structures Co. performed the post-tensioning work as subcontractor; Reliance Equipment Co. erected the main span.

Design of the bridge superstructure was prepared by T. Y. Lin and Associates, with Felix Kulka and Herman R. Reuter as design engineers.

For the United Water Conservation District, Walter P. Price, Jr., is chief engineer and general manager, while Earl Bengry was engineer in charge of the project.



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soft or hard spots, with true arc sections, all blades are cold-drilled and punched to preserve the original properties of the steel.

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Traffic problem on Idaho road job

CONTROLLING TRAFFIC during highway construction has always been a problem, but in recent years, with most roads carrying more than their design capacities, it has become the highway builders' No. 1 headache. This problem stands in sharp relief on a project now under way on U. S. 95 in central Idaho. For what do you do with 50 vehicles per hour when you have 240,000 cu. yd. of rock to blast where there is no possibility of a detour, and on a highway which is the only north-south route of any kind for 100 miles in either direction?

This section of U. S. 92 about 125

mi. south of Lewiston has always been a trouble-spot for the Idaho Department of Highways. For 30 miles the highway is subject to the whims of the Big Salmon River and follows a rocky canyon in which any type of construction is difficult and expensive.

For the most part the highway is only 22 ft. wide with curves as sharp as 20 and 30 deg., and with horizontal sight distances as little as 100 ft. But the Highway Department is devoting a lot of attention to this section and it is rapidly being brought up to fully modern standards. Soon the width will be 36 ft., maximum hori-

zontal curvature will be 5 deg. and minimum vertical sight distance will be 600 ft.

Two years ago major reconstruction began in the canyon. In order to reduce traffic to a minimum, announcements were printed and sent all over the state and to adjoining areas advising travelers of the delays; they might be subjected to if they traveled through this area. This had the anticipated effect on traffic volume but the complaints of roadside businesses varied in inverse proportion. Protests from people who depended upon long distance highway travel for their livelihood were expected, but it was not expected that they would be so organized and sustained.

So this year the notification of motorists is confined to a local area. Mimeographed sheets showing the exact time when traffic will be held up are posted in service stations and restaurants for about 25 mi. on each side of the construction. Although it is impossible to make everybody happy, this plan is, at least in this case, the most satisfactory compromise between the two schools of complaints.

Equipment List

- 1 Lorain 2-yd. crawler shovel
- 1 Lima 3-yd shovel
- 2 Euclid 15-yd. trucks
- 4 18-yd. Tournarockers
- 3 Caterpillar D-8 tractors
- 2 Caterpillar D-4 tractors
- 1 International Harvester TD-24 tractor
- 1 Caterpillar No. 12 grader
- 1 LeTourneau-Westinghouse 35-yd. Carryall
- 3 12-yd. Tournapulls
- 1 LeTourneau-Westinghouse 17-yd. scraper



SEQUENCE PHOTOS show blasting 10,000 cu. yd. during improvement of U.S. 95 in central Idaho. Biggest blast so far took out 20,000 cu. yd. Total excavation will be about 510,000 cu. yd., of which 240,000 cu. yd. is rock. Job required round-the-clock traffic control.

Cars are stopped every 1½ hr. during the day and every 3 hr. at night. The contractor is working two 9-hr. shifts. The longest single traffic delay is 3 hr., from 6 p.m. to 9 p.m., and when the 9 o'clock opening is made about 100 vehicles pass through the job in each direction. The contractor furnishes the flagmen. Sanitary facilities are provided for the motorists.

The 3.8-mi. long project is being handled by contractor Earl L. McNutt Co. of Eugene, Ore., for about \$572,000. Total excavation will run about 510,000 cu. yd., of which about 240,000 cu. yd. is rock. The biggest blast set off so far loosened about 20,000 cu. yd. of material.

The project started in December of 1955 and is expected to be made complete in September.

Supervising the work for Earl McNutt Co. is William Ridle. For the Idaho Department of Highways, Wendell L. Hersey is project chief and Jim Matteson is chief inspector.

BUILT FOR ROCK-HARD ROAD WORK



HD-21 • 204 net engine hp • 44,000 lb • torque converter drive

The Allis-Chalmers HD-21 Crawler Tractor is a Natural for Tough Jobs

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tiplies torque up to $4\frac{1}{2}$ times . . . develops 41,500 lb drawbar pull at low speeds . . . cushions the entire power train against load shocks.

New Tru-Dimension tracks bring a new high in track durability. Thousand-hour lubrication intervals save maintenance time. Positive seals protect idler, support roller and truck wheel bearings from abrasive wear as no other seals can.

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Southern Idaho Equipment Co.—Idaho Falls and Twin Falls
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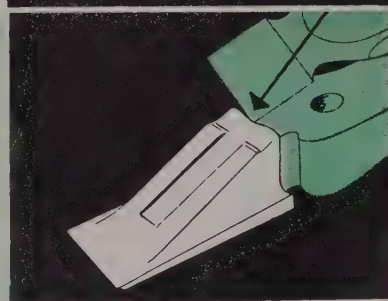
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Air entraining study by Bur. of Reclamation

THE QUESTION of how the spacing and size of tiny bubbles in concrete affect its resistance to deterioration from freezing and thawing will be studied by a Bureau of Reclamation research team under a \$9,000 research grant by the National Science Foundation, it was announced by Secretary of the Interior Fred A. Seaton.

Researchers know that tiny air bubbles in concrete act as chambers in which moisture can expand when it freezes, thus inhibiting the destructive effects of freezing. But what bubble size and spacing gives the best resistance? And what factors in the preparation of concrete control this size and spacing?

To get the answers, a three-man team, headed by Bureau Engineer J. E. Backstrom, will perform the tests and undertake the research required. He will use existing equipment of the Bureau of Reclamation's Denver Engineering Center.

"Bureau structures in many parts of the West are subjected each year to repeated cycles of freezing and thawing in the presence of moisture," Commissioner of Reclamation W. A. Dexheimer said. "For this reason the Bureau has long been interested in the problem."

Hundreds of specimens of different types of concrete of varied mix proportions and types of materials will be prepared for the research, using a variety of mixing methods. For each set of specimens the size, number, and spacing of air bubbles will be determined with special microscopic equipment. These results will be compared with the destructive effects measured in terms of weight loss and change of length of companion specimens subjected to alternately freezing and thawing action.

The expansion of water in concrete through freezing can cause progressive deterioration and is responsible for much of the spalling and scaling in exposed concrete structures.

"Should the project be successful, and we believe it will," Commissioner Dexheimer said, "not only Bureau structures but concrete structures everywhere subjected to these conditions can be made with greater durability and safety. The investigations may also lead to significant economies through reduction in cement requirements."

Supervising the research is J. E. Backstrom, who is in charge of investigations of concrete durability for the Bureau of Reclamation. Other members of the team include Harry L. Flack, who will be in direct charge of specimen fabrication and freeze-thaw testing; and David Ramaley, who will carry out microscopical determinations of the air-void control samples.

Planning assures more dams on Upper Columbia River

A PREVIEW of multiple-purpose dams and flood-control reservoirs that may be under construction in the Columbia River drainage area five or ten years from now was given by the Corps of Engineers at a series of public hearings held in the Pacific Northwest the week of July 9 to 15.

Purpose of the public hearings, as explained by Brig. Gen. Louis H. Foote, North Pacific Division Engineer, Portland, was to get the reaction of state and local agencies and residents to the various proposals for water-resource development. Many of the possibilities listed in the Corps' inventory of potential projects probably will be weeded out for one reason or another, but some of them will be built, either by the federal government or under the administration's partnership program, it was indicated at the hearings.

The Army Engineers are revising their "308 Report" of 1948, at the direction of the senate committee on public works, to bring this document on plans for the Columbia River and its tributaries up to date. Several federal agencies are cooperating with the Corps in its review, including the Bureau of Reclamation, Federal Power Commission, Bonneville Power Administration, Fish and Wildlife Service, National Park Service, Forest Service, and the Department of Health, Education and Welfare.

The public hearings were held at Missoula, Mont.; Spokane, Wash.; Lewiston and Boise, Idaho; and Portland. With growing public demand for upstream developments—projects cause less disruption of local economy and fewer relocation problems—much interest was centered on plans for the Clark Fork and Kootenai tributary basins (see map). These are the areas with the least development to date and they offer the opportunity for re-use of released storage water for power through numerous existing plants downstream on the main stem of the Columbia. Projects in these two sub-basins were discussed at a one-day hearing in Missoula, and are the subject of this report.

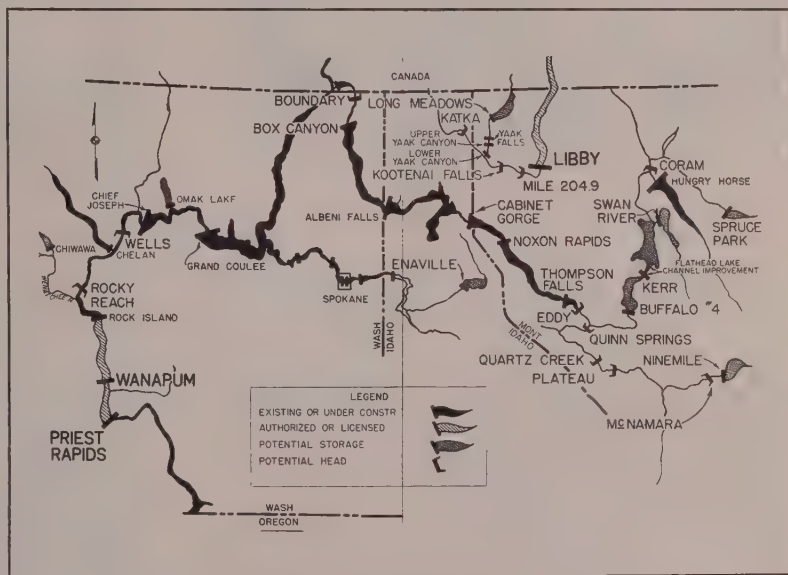
Clark Fork Basin

1. Blackfoot River Project—Power, flood control, and irrigation storage development on Blackfoot River northeast of Missoula, is being investigated by Bureau of Reclamation. Nine-Mile Prairie and alternate sites are included where 600,000 to 900,000 ac. ft. of storage might be obtained. At the Nine-Mile Prairie site, Bureau engineers believe a dam about 400 ft. high would provide more than 900,000 ac. ft. of storage.

Two 37,000-kw. generators would provide 28,500 kw. of firm power at the site and would add some 115,000 kw. of generating capacity downstream. Cost is estimated at \$60,000,000. However, the Bureau is studying a reduced pool level which would entail less cost and fewer relocation problems, but would provide 600,000 to 750,000 ac. ft. of storage space that normally would refill annually. A branch railroad, a state highway, and telephone lines would require relocation. Preliminary studies indicate

way, and the Spruce Park site is "not as promising as indicated by early map studies" according to a Bureau engineer. However, it is hoped that other sites will prove more favorable. The area is a wilderness where packing in with horses is necessary; detailed topography of the Middle Fork area is just now being obtained.

3. Flathead Lake Outlet Dredging—This is primarily a flood control project, being investigated by the Corps of Engineers. About 10,000 ft. of the lake outlet channel (Flathead River) would be excavated to a bottom width of 200 ft. to remove natural restrictions and increase the flow capacity at low lake stage from 5,000 cfs. to about 30,000 cfs. Army Engineers say the improvement would not alter high and low lake levels



the project is feasible but the investigation will not be completed for at least another year.

2. Flathead River Project—Power and flood control including transmountain diversion are also under study by the Bureau of Reclamation. Popularly known as the Spruce Park proposal (Spruce Park is one of four possible sites), this development probably would entail a dam about 350 ft. high on the Middle Fork of Flathead River in the area just south of Glacier Park. Some 300,000 ac. ft. of spring flood flows could be stored in the reservoir and diverted to the South Fork of the Flathead behind Hungry Horse Dam through a tunnel about 7 mi. long. Approximately 25,000 kw. of power could be generated at a plant to be built at the 650-ft. drop into Hungry Horse reservoir. At least 100,000 kw. of generation would be added at downstream plants, including Hungry Horse.

A rough guess at the cost of the project is \$50,000,000, according to engineers. Field investigations of this possibility are just getting under

which are prescribed within a 10-ft. range by federal power license to Montana Power Co., operator of Kerr Dam. Army Engineers are sounding and drilling the channel to ascertain the amount of excavation necessary. A preliminary estimate of the cost of dredging is \$5,000,000.

4. Buffalo Rapids No. 4 Project—This power and flood-control project given some study several years ago by Army Engineers, is now under investigation by Montana Power Co. The maximum development, as outlined by Army Engineers, would provide 568,000 ac. ft. of usable storage with 50 ft. of drawdown. The dam would be a combined concrete and earth embankment structure with a maximum height of 290 ft. and would cost about \$65,000,000. At-site firm power would be 152,800 kw., and it would add 155,000 kw. downstream. The maximum project would flood out two upstream damsites which are also being studied by Montana Power Co. Consequently, the company is considering a lower dam at this site, but Sam B. Chase, vice president, in-

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Meet the new 405 — In eastern Canada, a city street gets its face "lifted" with a 1-yard, 405 hoe. It's a new size, recently added to the Koehring heavy-duty line — digs 43 inches wide over side-cutters, 22½ feet below grade. Check into its other work capacities at bottom of page.

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305 ON RUBBER	¾-Yd.	50,000 lbs. 15,800 lbs.	at 10-foot radius at 30-foot radius
405 CRAWLER	1-Yd.	40,000 lbs.	at 12-foot radius
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10 years on the rock pile — Feeding rock to crusher at a Mid-West quarry, veteran ¾-yard Koehring shovel helps produce 1,000 to 1,500 tons of crushed rock per day. Shovel has been in use for over 10 years. In all this time, owner reports that his repair costs have been practically nil.



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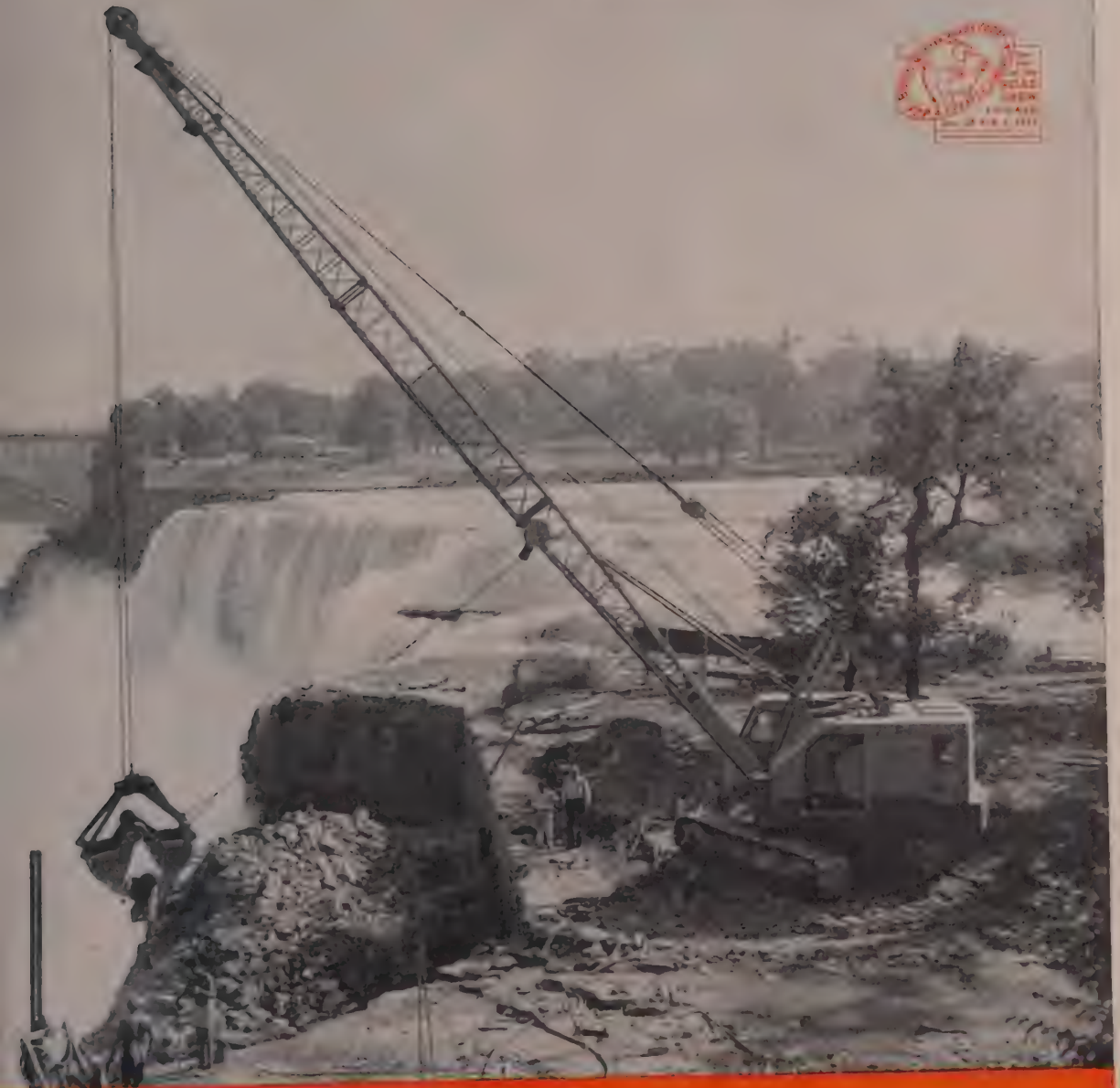
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185,000-ton rock slide — Extensive rock surgery will help curb further stream erosion at Niagara Falls. Work was made necessary when a weakened section of rock broke away from Lookout Point, at eastern end of the American Falls. Here, a Koehring 605 clamshell crane clears away debris and blasted rock.



AMERICAN MACHINE CO., Spokane, Washington
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 SAN JOAQUIN TRACTOR CO., Bakersfield, California
 ENGINEERING SALES SERVICE, INC., Boise, Idaho
 McKELVY MACHINERY CO., Denver, Colorado

licated Montana Power would be interested in building the larger dam under the "partnership program" with the federal government paying the flood-control portion of the construction cost, provided that the power phase of the project "proves feasible."

5. Swan River Project—A dam 2 mi. above the mouth of the river in Flathead Lake could be built to a height of 90 ft. and would provide 320,000-ac. ft. of usable storage, including the existing Swan and Echo lakes. It would develop only about 6,000 kw. at the site, but would add some 88,000 kw. downstream, according to Corps of Engineer estimates. No recent investigations have been

made of this project by the Corps, and it was once rejected by the Bureau of Reclamation because of the disruption to the local economy. Two hundred farms and 15,000 ac. of timber would be inundated.

Kootenai River Basin

1. Long Meadows Project—This power and flood-control project on the Yaak River, a tributary of the Kootenai, in the extreme northwestern corner of Montana, has received a preliminary investigation by the Corps of Engineers. A concrete dam 250 ft. high at Mile 30 above the mouth of the Yaak would provide at least 450,000 ac.-ft. of usable stor-

age with a gross head of 190 ft. The reservoir would cover a virtually uninhabited area of 7,700 ac. Construction cost is estimated at \$20,000,000.

Studies to date indicate the project is economically feasible. It would provide 12,000 kw. of firm power at the site and a potential of 63,000 kw. downstream. It also might make feasible several run-of-river power plants downstream, including Yaak Falls and Katka, and would materially reduce flooding in the vicinity of Bonners Ferry, Idaho, which suffers serious damage nearly every spring.

Note: Under the agreement of April 1949 between the Corps of Engineers and the Bureau of Reclamation, multiple-purpose projects in the Clark Fork Basin were allotted to the Bureau, and those in the Kootenai Basin to the Corps of Engineers. However, purely flood-control projects in the Clark Fork area are still the responsibility of the Corps, and irrigation projects in the Kootenai drainage would be developed by the Bureau. The agreement, resulting from a presidential directive, was designed to avoid rivalry and duplication of efforts. It is still in force, as was indicated at the Missoula hearing.

Fierce local opposition to the Swan River Project was evident at the Missoula hearing. Chambers of Commerce of Kalispell and Polson as well as Farmers Union and Grange groups filed protests, and a dozen residents of the farming communities that would be flooded out were heard in opposition.

The Missoula Chamber of Commerce by a 60-40% vote indorsed the Blackfoot River Project, and other organizations and individuals were also divided on the proposal. The Spruce Park plan was opposed principally by fish and wildlife organizations, but it was indorsed by the Kalispell Chamber of Commerce.

It was brought out at the hearing that the authorized Libby Dam Project on the Kootenai is still stalled because of Canadian refusal to agree to it. This dam would back water across the Canadian border, and Canada's acquiescence is necessary under international treaty. Canada is investigating the possibility of diverting part of the Kootenai flow to the Columbia River at Canal Flats, B. C., and part of the Columbia's flow to the Fraser River, General Foote explained.

Charles S. Hazen, Spokane area engineer, and O. M. Browne, regional project development engineer, of the Bureau of Reclamation, were present and discussed the Bureau's investigations in the Clark Fork Basin. Stewart Brown and Noble Bosley, civilian engineers of the Army Engineers planning staff, explained the Corps' flood-control and multiple-purpose projects for the Columbia Basin in general and those in the Clark Fork and Kootenai sub-basins in particular.

Fresh air for Cascade railroad tunnel

CREWS of Morrison-Knudsen Co. are putting the finishing touches on a ventilation system for the Great Northern Railroad's Cascade Tunnel. The tunnel cuts under Stevens Pass in Northwestern Washington and at 7.8 mi. is the longest railroad tunnel in the western hemisphere. When Great Northern decided to change over from electric to diesel locomotives on this section of their system something had to be done to keep the tunnel cool because the high temperatures so seriously affected the efficiency of the diesel engines that the trains couldn't get through.

A contract was signed with M-K to install two 6-ft. diameter Joy fans at the East Portal which together can send 525,000 cfm. of fresh air into the tunnel. Only one fan is operated

against an advancing train. Both fans are used to flush out the tunnel after a train has passed through. To make sure the air travels all the way through, even past an oncoming train, an overhead steel door at the East portal will automatically close when a train enters the tunnel from the west end. This will prevent the air from backing out the same portal through which it enters. For west-bound traffic the door will remain open and the fans will not be used.

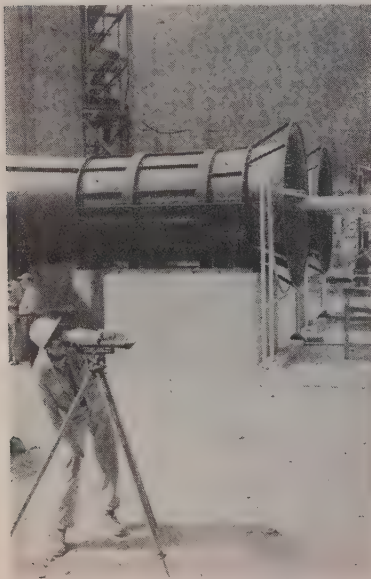
The job is located in the Cascade Mountains at Berne, Wash., at an elevation of nearly 3,000 ft. This means that the winters are severe and no work was done from November to April. The concrete in the portal structure includes heating cables which in future winters will keep the usual 15 to 20-ft. drifts from piling up.

About 1,000 cu. yd. of concrete were needed for the portal structure (which houses the overhead gate), the air ducts (which enter the tunnel at an angle just inside the entrance), the machine house, and the machine footings. Aggregate was obtained from nearby towns and trucked to the job. Batching was done with a C. S. Johnson batcher which had a 5-cu. yd. hopper for sand and a 5-cu. yd. hopper for gravel. Mixing was done with a 1/2-cu. yd. Ransome mixer.

The two Joy fans will be operated by two General Electric 800-hp. electric motors. Power will be supplied by Puget Sound Light & Power with an emergency 750-kw. diesel generating set supplied by the Electromotive Division of General Motors.

Great Northern's inspector on the job is R. A. Wolfe. For Morrison-Knudsen, Jim Morrison is project manager, John Arrington is general superintendent, Jim Kickhofel is project engineer, and Walt Sabin is office manager.

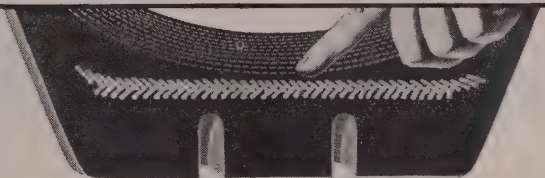
An 11,000-volt overhead line which powers the electric engines was a construction hazard, but the job has progressed without mishap.



PROJECT ENGINEER Jim Kickhofel sets a point with the two 6-ft. diameter fans in the background. In the far background is the portal structure which houses overhead sliding gate which prevents air from short-circuiting fans.

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ALASKA Newsletter

By CLIFFORD S. CERNICK, Anchorage

PEAK EMPLOYMENT—Construction employment in Alaska has soared to a five-year peak and before the season is over may well have set an all-time record. Work is being pushed on more than a score of vital Alaskan projects as nights get longer and the hint of winter is in the autumn breeze. The tempo of construction work is increasing with realization that when winter comes most jobs must be closed down. Very little outside construction is feasible in the Territory during the bitter cold of the winter months.

LETTERS DROP OFF—During the spring and early summer, a variable flood of letters poured into the offices of the Territorial Employment Service in Anchorage inquiring about Alaskan employment opportunities. Now that the construction season is reaching a close, this flow of mail also is dropping off, according to John Isidore, manager of the office.

CARPENTERS COMPLAIN—The Carpenters Union, Local No. 1281 in Anchorage, has a complaint on information about Alaska jobs sent to press services by correspondents in the Territory. Peter W. Lannen, financial secretary, said that when readers in the States are given news about multi-million defense jobs in Alaska, they aren't warned that a great deal of the money allocated will go for equipment rental, maintenance, and transfer, rather than for wages to construction workers. Lannen feels that newspapermen should send out stories cautioning workers against scurrying to Alaska for the "big money." Many such warnings were included in the Alaska Newsletter—so this writer pleads "not guilty" to Lannen's complaint.

SOME UNEMPLOYMENT—Although the peak of the construction season is here, the Alaskan employment picture is still only fair, according to representatives of several major unions. Descriptions of the employment scene ranged from "very bad" for plumbers and steamfitters to "not bad" for plasterers and pile-drivers. This is the worst year the plumbers and steamfitters have ever had in Alaska, a representative said. Last year, for example, all were employed by this time of the year. Now, however, nearly 40 are out of work.

LABOR SITUATION—Unemployment has apparently hit the Laborers and Hod Carriers Union in Alaska harder than any other worker cate-

gory. In the Anchorage local alone, more than 200 men in the Laborers Union are still seeking jobs. Harold Groothuis, representative for the Union, blamed publicity on Alaskan projects for bringing in a heavy influx of workers from the States. There's another side of this coin, of course. On the brighter side, more than 1,500 members of the Laborers Union are now holding down jobs, an impressive figure compared to past years. Some of the job sites are as far away as Adak, Cordova and Unalakleet. The Teamsters Union here has about 80 unemployed and about 1,200 on the job. The Union thought the season would be exceptionally good, but contracts didn't come through as expected and work got under way very slowly.

END OF ROAD COMMISSION—The Alaska Road Commission, which has built 4,039 miles of roads in the Territory during its half-century existence, passes into history on Sept. 15 of this year. Under the new highway bill passed by Congress, the Bureau of Public Roads will absorb ARC. William Niemi, ARC chief engineer, says the change will not mean any immediate change in personnel or activity of the Road Commission. "Under the new setup, we will be in a better position for long-range planning of Alaska's highway system because of appropriations that are steady and known," Niemi said.

FLOATING HOME—Providing living quarters for construction men working on remote Sitkinak island south of Kodiak was solved in a unique way by the contractor. An \$80,000 barracks "barge" was built to house the workers and was moored in a sheltered lagoon on the island. The barge is 138 x 38 ft. in size and provides sleeping quarters for 50 men and a messhall for 150.

MUNICIPAL CONSTRUCTION—A check of municipal construction projects planned throughout Alaska reveals the following information: Fairbanks is now planning the second phase of its redevelopment program, to include sewers, water lines, streets, sidewalks, rehabilitation of substandard buildings and a new park. Nome is contemplating rehabilitation and expansion of its electrical system. The city of Seward has filed an application for a license to build a \$2,400,000 hydro project on Crescent and Carter lakes on Alaska's Kenai peninsula. Sitka is planning to redevelop a blighted residen-

tial area located just east of its central business district. Advance planning funds in the amount of \$47,000 have been authorized by the Housing and Home Finance Agency.

HARBOR AND FLOOD CONTROL WORK—A considerable amount of construction will take place in Alaska during the next fiscal year in the category of harbor and flood control projects. Appropriations have been authorized for a \$393,000 flood control project at Juneau, \$129,000 breakwater at Valdez, \$500,000 small boat basin at Ketchikan, \$500,000 small boat harbor at Kodiak and \$365,000 for a mooring basin at Craig.

ALASKA ROAD FUNDS—Construction funds for the Alaska Road Commission authorized for the next fiscal year include \$7,800,000 for new work and \$3,625,000 for maintenance. Alaska's share of funds provided under the Highway Act of 1956 covering primary and secondary roads on the public domain will be \$1,932,588.

ALASKA PUBLIC WORKS—Nine projects are included in the \$4,968,000 appropriation passed by Congress for the Alaska Public Works program covering the next fiscal year. This includes \$170,095 for Petersburg streets, \$229,260 for a multipurpose schoolroom at Kenai, \$653,415 for a 100-woman dormitory at the University of Alaska and \$750,865 for an arterial addition at Ketchikan. Also included is \$1,015,670 for a high school and auditorium at Fairbanks, \$22,170 for water main extensions at Wrangell, \$478,775 for a high school at Valdez, \$699,330 for the Knik Arm outfall sewer at Anchorage, and \$423,420 for a sewer at Mountain View, Anchorage suburb.

APPROPRIATION ROUNDUP—Some miscellaneous figures on 1957 Alaska appropriations for various agencies should be of interest to contractors. Weather Bureau, for example, was allocated \$2,713,000 including \$670,000 for new construction (housing) at Kotzebue, McGrath, Naknek and St. Paul. A 50-bed hospital at Kotzebue, will be made possible through appropriations made available to the Department of Health, Education and Welfare. Appropriations of \$80,000 were made for Bureau of Indian Affairs schools at Belkofski, Copper Center and Perryville. Included in the \$13,840,150 total for the Civil Aeronautics Administration is \$170,000 for repair work on the Nome airport, \$618,000 for operation and maintenance of the Fairbanks and Anchorage airports and \$1,350,000 for Alaska's share under the Federal Aid to airports program.

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REPORTS from the COURTS

By HOWARD S. BURNSIDE, Low and Burnside
Attorneys at Law, San Francisco—Menlo Park

Eeny-meeny-miny-mo

Here is a test for a Solomon and a case of simple words creating ambiguity through inexpert use.

"The Owner agrees that the Builder shall receive for his services the sum of 10% of the total cost of construction . . ."

"It is agreed that the total fees of the builder shall not exceed the sum of \$2,100 . . ."

"The builder guarantees . . . the total cost shall not exceed \$28,000 . . ."

Given a resulting cost of \$29,319 which includes \$1,400 of the fee, apply the above contract provisions and decide whether the Builder should get the remaining \$700 of maximum fee, should refund \$1,319, or should have a total fee of \$2,931.

If you have made your decision read now the opinion of the California appellate court:

"The contract provides that the compensation of (the Builder) shall be a percentage (of total cost) and not exceed \$2,100, so that obviously the fee . . . was not a part of the 'total cost of construction.' The guarantee that the 'total cost' should not exceed \$28,000 is therefore sufficiently ambiguous to permit the introduction of parol testimony to explain the intent of the parties. (The Builder) testified that the parties understood and agreed that his fee was not to be considered a part of the \$28,000 guaranty. Thus, the trial court was justified in its determination that the 'total cost' of the building did not exceed \$28,000."¹ And so the Builder was entitled to the remaining \$700 of the maximum fee.

1. Miller v. Brown 136 C.A. 2d 763

Responsibility for locating structure

It is relatively common to discover that a newly completed structure is located improperly on the owner's property or even encroaches on adjacent property belonging to another. Responsibility for such error may rest with the owner or the contractor who built the structure, depending on circumstances.

The source of such an error can usually be traced to misplaced marker stakes, improper or inadequate surveys or erroneous property description. Accordingly, liability for damages will be assessed depending upon who undertakes to furnish the data. Generally the contractor is not

in as good a position as an owner to furnish surveys, property data and such. A safe rule of thumb is to provide in the contract that the owner will furnish all necessary surveys or location data.

In the case of Broomfield v. Koval¹, a motel was improperly located on the lot. The court found in favor of the contractor for the balance due on the contract. It appeared that the owner set out marker stakes to guide the contractor. Later, it was determined that the stakes were improperly fixed.

1. Broomfield v. Koval 292 Pac. 2d 1073 (Nevada)

Withdrawal of oral subcontract is breach of contract

This case illustrates the hazard involved in seeking to reduce subcontractors bids after winning an award of general construction on competitive bidding.

Shortly after defendant learned he was low bidder on the general construction contract for school buildings he orally informed the plumbing sub-contractor that the bid for plumbing, heating and ventilation, in the sum of \$56,700, would be accepted. Later the defendant went to the sub-contractor and tried to induce him to lower his bid some \$2,000. This was refused and the defendant arranged with another firm to do the plumbing and heating work.

No mention or request for any further terms as a condition to the execution of a formal sub-contract was made by defendant except for the effort made to induce a lowering of the bid. The plans and specifications were very detailed and covered all possible conditions of the project.

The "rejected" sub-contractor brought an action for breach of contract and obtained a judgment against the defendant in the sum of \$6,700. Upon appeal the defendant contended that the bid was never accepted, that negotiations were merely tentative and that the parties did not intend to be bound until the execution of a written sub-contract.

The Supreme Court of New Mexico affirmed the judgment, observing that the case was a "close" one. "Parties to an oral, informal agreement may or may not become bound prior to the execution of a contem-

plated formal writing, depending upon their intention to be or not to be so bound."¹ The key word is "intention." This involves a determination of what a party "intends" by noting his actions and words under the particular circumstances. Obviously, one seeking to avoid an obligation would not be expected to say he intended to make a binding oral contract.

The Supreme Court reviewed all details of the transaction as they were put into evidence in the trial court. The plain implication was that all essential terms and conditions had been agreed upon and the oral acceptance was binding.

1. Stites v. Yelverton 289 P. 2d 628

Filing of counterclaim held essential

When a suit is filed the defendant must prepare and file an answer and include any new matter constituting a counterclaim he may have. A counterclaim tends to diminish or defeat the plaintiff's recovery. If the defendant omits to set up a counterclaim arising out of the transaction he can never afterwards sue the plaintiff for that claim.¹

In California, the rules of what constitutes a counterclaim are very technical and somewhat obscure. A wrong conclusion as to whether to make a counterclaim or to bring a separate suit later is deadly.

In a recent case a contractor sued a sub-contractor and the judgment was that neither party recover from the other. Later the subcontractor brought an action to trial on a claim against the contractor and obtained a judgment in the trial court. The Supreme Court of California reversed the judgment, saying in effect that it was properly a part of the first case tried and was therefore barred.

"The law abhors a multiplicity of actions, and the obvious intent of the Legislature . . . was to provide for the settlement, in a single action, of all conflicting claims between the parties arising out of the same transaction. Thus, a party cannot by negligence or design withhold issues and litigate them in successive actions; he may not split his demands or defenses; he may not submit his case in piecemeal fashion."²

1. 437, 438, 439 Calif. Code Civil Proc.

2. Flickinger v. Swedlow Engineering Co. 45 Cal. 2d 388

Notes

"One may, without abandoning his real name and without fraudulent intent, adopt any name different from his and by which he may transact business, execute contracts, sue and be sued. A man's name is the designation by which he is distinctively known in the community."

Sanders v. Sitton 292 P. 2d 1099, 1101

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digging**

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wire rope**

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Here's the wire rope designed for the shock, pull, jerk of digging in rock. It's Yellow Strand Flattened Strand shown working for Donlon Construction Co., Nashville, Tenn. Donlon is cutting a 15-foot deep cut—most of which is rock—in preparation for laying a 15-inch sewer line. Donlon chose Yellow Strand Flattened Strand for the job because they knew it would stand up longer . . . take more abuse . . . turn in more profitable work under these rugged conditions. The Superintendent on the job, Clyde Fuqua, reports, "There's less breakage by using Flattened Strand Yellow Strand."

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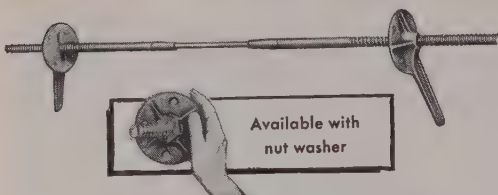


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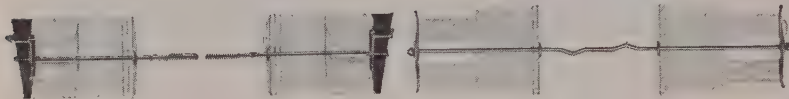
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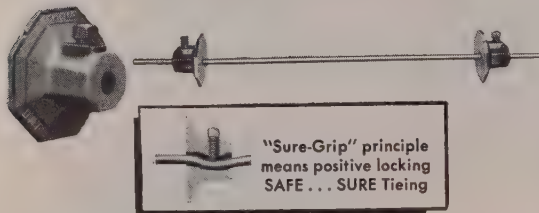
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Structural Design Chart—II

By **THOMAS HARAN**

Civil Engineer

AS AN EXPLANATION for the reader who may have missed the first of this series, which began in last month's issue of **Western Construction**, the writer wishes to reiterate that the twelve sheets in the set are an illustrated representation of his interpretation of the structural design requirements of the American Concrete Institute's Building Code (ACI 318-51). The requirements do not appear on the sheets in the same sequence as they are entered in the Code but have been arranged in a manner that is felt to be more convenient and faster for the structural designer.

Symbols, abbreviations, and terminology will be found to be readily recognizable by most designers and in most cases corresponding to the A.C.I. Code. Where subscripts have been added or other variations occur explanations are indicated on the sheets.

Four charts on floor slabs

As indicated by the titles, the first four sheets cover the structural analysis of various types of conventionally reinforced concrete floor construction. The second sheet of the series, which appears on the opposite page, is a continuation of part "B" that appeared at the bottom of Sheet No. 1 and is reprinted here for convenience of the readers:

B. 2-WAY SLABS supported on 4 sides including solid, ribbed to waffle slabs (with or without top slabs) shall be analyzed by one of the following methods:

1. Find r & r_1 by elastic analysis with TL on panel under consideration only, or if L or $L_1 \geq 2/3$ & $\leq 3/2$ adjacent continuous spans find r & r_1 from cases '1) to (6).

The foregoing statement and Sheet No. 2 combine to form the structural analysis requirements of the two methods of analysis presented in the A.C.I. Code. The coefficients and many of the requirements have been noted, graphically illustrated, or tabulated in a different manner; but all of them have been derived from the Code.

Though these sheets are self-explanatory to the experienced designer, the reader should bear in mind that the information is quite condensed and that symbols and abbreviations have been utilized extensively.

A.C.I. STRUCTURAL ANALYSIS OF FLOORS

Two-way Reinforced Slabs

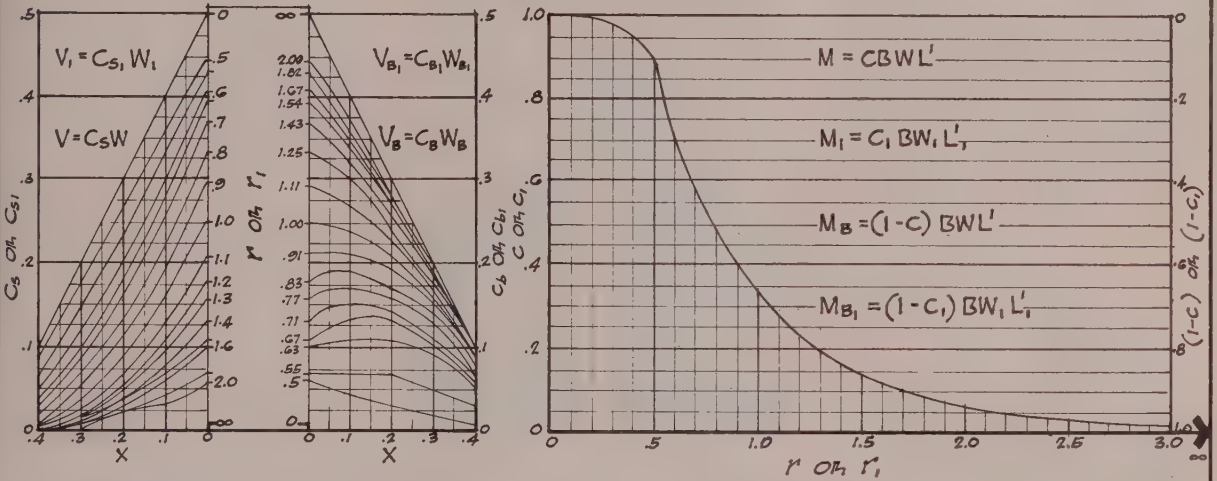
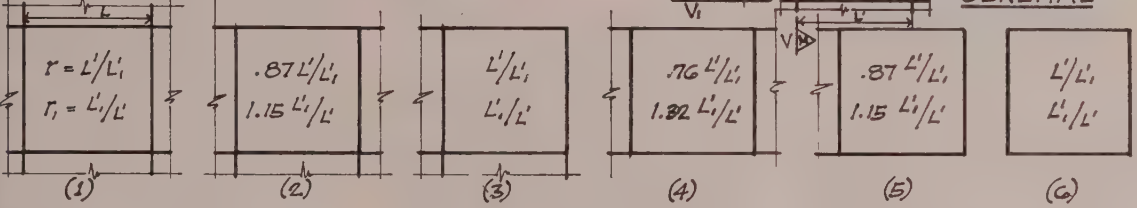
— INDICATES LINE OF SUPPORT

--- INDICATES LINE OF INFLECTION

$B = M$ COEFFICIENT FOUND BY (A); $w = TL / l^2$

W_B OR $W_{B_1} = TL$ ON BEAM FROM 1-WAY SLAB

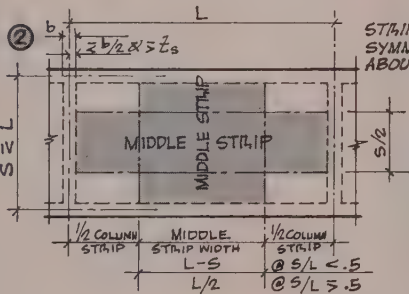
W OR $W_1 = TL$ ON SLAB STRIP OF ANY WIDTH.



-M IS MAXIMUM @ FACE OF SUPPORT.

IF M 'S OF ADJACENT SPANS ARE UNBALANCED @ SUPPORT INCREASE V BY 15 %.

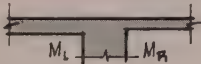
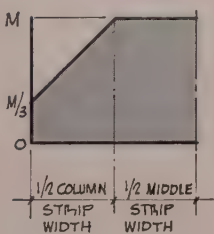
IF (A) (3) M COEFFICIENTS ARE USED, AVERAGE VALUES OF C_W OR C_{1W} FOR THE 2 SPANS ADJACENT TO THE SUPPORT SHALL BE USED TO FIND - M @ FACE OF SUPPORT.



STRIPS ARE SYMMETRICAL ABOUT PANEL C_2

CASE SHOWS IN (1)	TYPE OF M	LONG SPAN C FOR ALL S/L	SHORT SPAN C				
			S/L				
			1	.9	.8	.7	.6
(1)	CONTINUOUS- + -	.033 .025	.040 .030	.048 .036	.055 .041	.063 .047	.083 .062
(2)	CONTINUOUS- END - + -	.041 .021 .031	.048 .024 .036	.055 .027 .041	.062 .031 .047	.069 .035 .052	.085 .042 .064
(3)	CONTINUOUS- + -	.049 .025	.057 .018	.064 .032	.071 .036	.078 .039	.090 .045
(4)	CONTINUOUS- END - + -	.037 .029 .044	.043 .033 .050	.048 .037 .056	.054 .041 .062	.059 .039 .068	.068 .049 .074
(5)	CONTINUOUS- END - + -	.058 .029 .044	.066 .033 .050	.074 .037 .056	.082 .041 .062	.090 .045 .068	.098 .049 .074
(6)	END - + -	.033 .050	.038 .057	.043 .064	.047 .072	.053 .080	.055 .083

FOR L & S SPANS MIDDLE STRIP $M_1 = C_W S^2$
1/2 COLUMN STRIP M_1 VARIES THUS:



IF $M_L < .8 M_R$
DESIGN FOR:

$$M_L + (2/3) \Delta M / K_L / \Sigma K$$

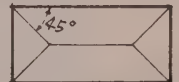
$$M_R + (2/3) \Delta M / K_R / \Sigma K$$

ALL V 'S ARE FROM TRIBUTARY AREAS THUS:

FIND BEAM M 'S FROM EQUIVALENT UNIFORM LOAD:

S SPAN: $wS/3$

L SPAN: $(wS/3)[3 - (S/L)^2]/2$



PANEL PLAN

T. HARAN

M.E.C. 55

ARBA expands staff and services

AS PART of a broad program to step up its services to the highway industry, ARBA last month announced a number of expansion plans.

Implementing a broadened program under the leadership of its new executive vice president, Major General Louis W. Prentiss (ret.), the Materials and Supplies Division will be enlarged and headed by a new managing director and a field director has been added to the Contractors Division.

In announcing the actions, Executive Vice President Prentiss said:

"The association must make itself available for greater service to the industry it represents. During the years ahead ARBA members will need their national association more than ever before.

"And by the same token ARBA will be asking more support from its membership in the near future in a broad attack on the industry's problems. We have to operate on a two-way street, if ARBA is to have the authentic information it needs to continue as the voice of the industry.

"All of our expansion plans will be guided by this philosophy," he said, "that in order for the whole organization to be effective, it must seek more information from and produce more information for each segment of the industry.

Wiley heads Division

John E. Wiley, assistant executive secretary of the American Association of State Highway Officials, has



Wiley

been appointed managing director of the Materials and Supplies Division,



Gunn

and will play a prominent part in stepping up the activities of that division. He assumed his new duties on August 1.

Wiley, who is well acquainted in Washington, has been with the ARBA since 1950, serving the American Association of State Highway Officials as assistant executive secretary. Prior to that assignment, he served in the Wyoming State Highway Department in many capacities. Except for a 10-yr. term of army service as a colonel during and immediately following World War II, Wiley had been with the Wyoming Highway Department since 1927.

The Materials and Supplies Division of ARBA is potentially one of the largest units in the organization which represents every segment of the highway industry. Members are producers of the materials used for highway construction—steel, concrete, asphalt, and others. Wiley's appointment marks the first step in a plan to encourage technical materials research and standardization. He will be concerned with anticipating "soft spots" in production and supply and will direct the ARBA Task Force reporting on capacity of this segment of the industry.

Gunn becomes field director

W. Guy Gunn, 41, of Houston, Texas, has been retained by ARBA as field director of the Contractors Division. Gunn comes to the association with a background of experience as an administrator, newspaper publisher and Chamber of Commerce executive.

After a brief period in the Washington headquarters office, Gunn will direct an aggressive membership extension campaign. Emphasis will be placed on organizing additional state affiliations in the Contractors Division.

Bid \$12,038,091 for Rocky Reach Stage 1

LOW BIDDER for the first stage of the Rocky Reach hydro project on the Columbia River near Wenatchee, Wash., submitted a figure of \$12,038,091. This bid was from a combination of four firms bidding jointly: Arundel Corp., L. E. Dixon Co., Hunkin-Conkey Construction Co., and American Pipe and Construction Co. These



KEY FIGURES AT START OF COYOTE DAM

Brig. General William F. Cassidy, South Pacific Division, Army Engineers, cements a partnership with Guy F. Atkinson for the construction of Coyote Dam on Russian River, near Ukiah, Calif., at the ground-breaking ceremonies held in that city. The Guy F. Atkinson Co. of South San Francisco, Calif., was recently awarded a \$7,500,000 contract with the Corps' San Francisco District for the 6,000,000-cu. yd. earthfill dam. The structure, 163 ft. high and 3,500 ft. long, will impound 122,500 ac.-ft. of water in a reservoir 5 mi. long and 1 mi. wide.

same firms operated jointly in a major contract on the Chief Joseph Dam and the Arundel-Dixon combination is now carrying out the contract on the Mayfield Dam for the City of Tacoma.

The second low bidder for the Rocky Reach Project was a combination of Morrison-Knudsen Co., Inc., Henry J. Kaiser Co., and Peter Kiewit Sons' Co. at \$14,465,799.

A feature of the bidding schedule requires the contractor to introduce a figure representing the number of days required for completion of the work. The low bidder presented a figure of 609 days and the second low bidder the corresponding figure of 578 days. The bid figures and the completion time are being tabulated and compared.

Plans and specifications for the project were prepared by Stone and Webster Engineering Corp. The project is being carried out by the Chelan County Public Utility District No. 1.

Later, one or more additional contracts will be awarded to cover the second-stage work.

Record Canadian bridge at Vancouver Harbor

CONSTRUCTION of Canada's second largest cantilever bridge, costing \$16,000,000, is under way at the Second Narrows in Vancouver harbor.

First contract for the bridge, covering substructure and approaches, has been let to Kiewit-Raymond for approximately \$4,300,000. Consulting engineers are Swan, Wooster & Partners, Vancouver, B. C.

To span 2,800 feet of water, the new six-lane high level bridge will have a steel superstructure 3,200 feet long and a cantilever main span 1,100 feet in length. Construction will be of reinforced, prestressed concrete, using 120-foot girders. Minimum vertical clearance is set at 145 feet.

Grade separations, with underpasses are proposed at Dollarton highway on the North Shore and at Cambridge with Skeena and Cassiar Streets, and at the main approach with Skeena Street. Total length of the bridge with approaches will be two miles, while all connecting roads will cover a distance just under three miles.

Materials to be used in the project include 80,000 cu. yd. of concrete, 3,800,000 tons of reinforcing steel and 20,000 tons of structural steel. By comparison, the Lions Gate Bridge required only 9,000 tons of structural steel; Granville Street Bridge, 8,000 tons; and Pattullo Bridge, 6,500 tons.

Second contract, covering superstructure steel, will be submitted to tender shortly; and the final contract, for grade separations on the Vancouver side and minor details, will be ready for tender by the end of the year.

"Woody" Williams dies; a builder of big dams

C. B. "WOODY" WILLIAMS, 53, vice president of Morrison-Knudsen Co., Inc., and an internationally known builder of large dams, died at Boise, Idaho, Aug. 4. Woody Williams joined the Morrison-Knudsen organization in 1926 as a foreman during construction of Guernsey



C. B. "Woody" Williams

Dam in Wyoming. In the early '30s he was the assistant general superintendent of construction of Hoover Dam, now considered the masonry model of all dams. Credit for the development of much of the modern equipment used today in the building of the world's most massive structures goes to Woody Williams.

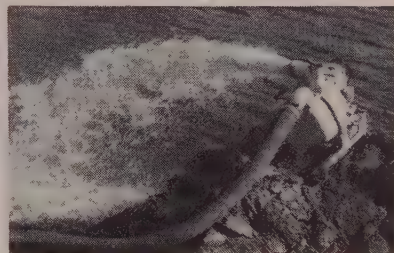
At the time of his death he was directing construction of Brownlee and Oxbow dams in Hells Canyon on the Snake River, Donnell's Dam, part of the Tri-Dam Project in California, Noxon Rapids Dam in Montana, as well as Table Rock in Missouri.

Beavers to hold Second Award Day

The second Annual Award Day and dinner of the Beavers will be held on January 17, 1957 in the Biltmore Hotel, Los Angeles. Announcement of the date was made by L. E. Dixon, president of the Beavers.

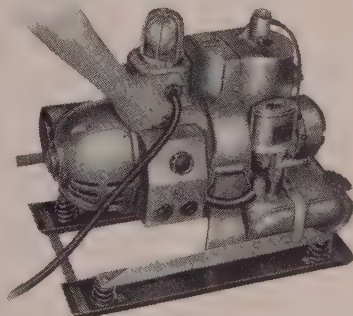
Men and companies who have carried out large construction projects in the West formed the Beavers in 1955, and held their first meeting in 1956.

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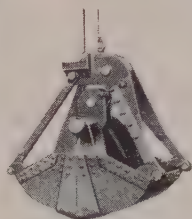
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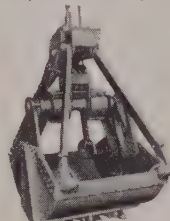
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First cement plant to be built in New Mexico

THE FIRST cement-manufacturing plant in New Mexico is under design by the Permanente Cement Co., according to an announcement by Henry J. Kaiser, chairman of the board and president. This is the first step in a proposed \$10,000,000 investment in New Mexico, including a plant with an annual capacity of 1,400,000 bbl., located at Scholle, approximately 55 mi. southeast of Albuquerque.

Design by Kaiser Engineers

Design of all facilities will be handled by Kaiser Engineers Division of Henry J. Kaiser Co. Present schedules call for initial operation of the plant during the fall of 1957.

The New Mexico plant will be designed as a single-kiln operation, using the wet-process method of manufacture; and allowance will be made for future expansion as market requirements increase. An initial work force of approximately 100, with a payroll of more than \$500,000 annually, is contemplated. Permanente management has been considering the advantages of building a plant in New Mexico for several years. The state has a large and growing market for cement and excellent limestone and gypsum deposits, yet has no local cement plant. Consumption of cement within the state is in excess of 2,000,000 bbl. annually and, in addition, there is a growing market in the Texas Panhandle and northern Arizona. Since 1946, there has been a continuing shortage of cement in New Mexico which has appreciably restricted the growth of the state's construction industry. The market is presently supplied from existing plants in Texas and Colorado.

Site near state's center

Site for plant is on U. S. Highway 60, near the geographical center of the state. The Santa Fe Railroad, natural gas and power lines run through or adjacent to the property. Permanente has an option on approximately 2,000 ac. Exploratory drilling shows indicated reserves of excellent cement-grade limestone, sufficient for more than 100 years of operation under presently planned requirements. Ample supplies of clay and gypsum are located nearby. Water for use in the plant's wet-process system, will be from wells.

Plant equipment will include a 12-ft. rotary kiln 450 ft. long, one of the largest in the cement industry; raw and finish-grind mills; modern dust control equipment; sacking machinery; complete quarrying and primary crushing equipment; warehouse, laboratory and administration building.

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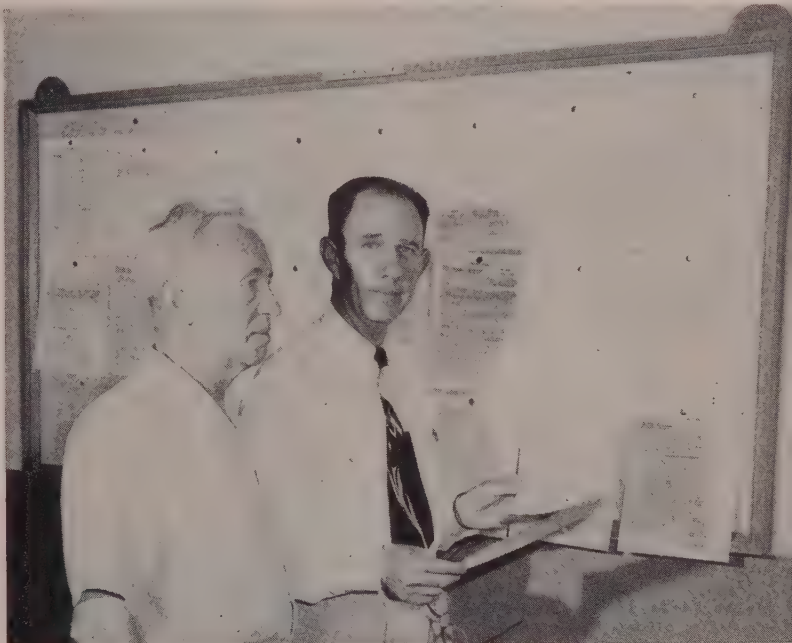
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Arizona Highway Department plans to make full use of Federal funds

A STATEMENT of policy issued by the Arizona State Highway Commission in July gave assurance to the people of Arizona that the State will move forward with the rest of the nation by taking full advantage of the Federal Highway Bill. Approximately \$209,000,000 will be available over the 13-year period to modernize and enlarge the 1,200 mi. of interstate highways within the borders of Arizona.

filed with the Bureau of Public Roads. The statement also made clear that "in many instances, the retention of the road in its exact location and compliance with engineering standards . . . would create more hardship on the area and existing businesses than would the re-routing of the main highway with plainly marked access roads leading to the existing business district." It is the plan of the highway department to



STATE Highway Engineer William Willey (right) and William Johnson, engineer of contracts and specifications find it necessary to plan an extension to the "Call for Bids" bulletin board. The number of bid calls put out by the Arizona Highway Department, as a result of accelerating construction program, has resulted in a rush order for a larger bulletin board.

According to the official news bulletin of the Arizona Highway Department, the modernization of Arizona's "Model T" highway system may cause some business relocations and adjustments. The statement pointed out that "while considerable latitude is given to local State officials in routing and planning, the construction standards of the Interstate System and large portions of Federal funds to be invested makes some of that State control more apparent than real. In many instances right-of-way requirements (as much as 300 ft. in some cases) and requirements that access to Interstate roads be controlled and permitted only at certain points, makes it financially and physically impractical to rebuild and improve some interstate routes upon their exact present location."

Assurance was given that before moving any highway to an extent that would constitute a "by-pass" of a community, a public hearing will be held and a transcript of the hearing

first bring up to standard the many miles of substandard rural road on the Interstate System and then to construct alternate routes and limited access roads as may be required in the vicinity of towns and cities.

Change in contract policy

A program for contracting with private engineering firms to expedite the large highway building program was approved by Attorney General Robert Morrison who said that such contracts could be negotiated by the Arizona highway department. The attorney general advised the State Highway Commission that, in his opinion, private engineering firm can be hired to provide figures and facts and assist in preparation of plans and specifications on highway projects. The state highway engineer will then approve the plans and specifications and adopt them as his own. Each contract entered into is to be approved by the attorney general before award is made to the private engineering firm to carry on such work.

Industrial and research buildings

LARGE BUILDING projects for industry, research and commercial activity continue to expand construction activity in Southern California. Some of the larger projects recently started or in active stage of construction follow:

U. S. Borax and Chemical Corp. has announced plans for a \$1,000,000 research center to be constructed near Anaheim. The plant will occupy part of a 5-ac. site immediately adjoining the Richfield Research Center.

General Electric Co. has under construction a warehouse of its Lamp Division covering an area of 118,000 sq. ft. Cost is estimated at \$2,000,000.

A commercial building with a cost of \$1,100,000 is being erected by National Properties, Inc. in Beverly Hills. The structure will be two stories with basement and a partial third floor providing an aggregate floor area of 45,000 sq. ft.

Federal Telecommunication Laboratories recently broke ground for a \$2,500,000 Research Laboratory with a floor area of 113,000 sq. ft. The research center will occupy a 9½-ac. plot in Los Angeles. The building will be a combination of steel frame and tilt-up walls.

Contract for steel erection for a new \$5,000,000 compressor station of the Southern California Gas Co. has

recently been announced. The building will house eight compressors that will pump natural gas from holders into distribution lines.

A five-story office building representing a cost of \$1,500,000 has been started in Beverly Hills. Floor space will total 60,000 sq. ft. and completion is scheduled for next spring. The building will be fully air conditioned.

Steel work is well advanced on an \$8,000,000 research center for Northrop Aircraft, Inc. at Hawthorne. The structure will include a six-story engineering tower and other facilities for personnel. Nearby will be a structure designed for testing jet engines. Research will include work on guided missiles and the use of nuclear energy.

Rosendahl Corporation has been awarded a contract by American Brass Co. for construction of a mill at Paramount, Calif. The project represents an ultimate investment of \$18,000,000.

Death Valley highways

IN THE DEATH VALLEY National Monument a \$6,400,000 improvement program is scheduled to be carried out by the National Park Service. Of this total, \$4,625,000 will be used for surfacing an extensive

mileage of gravel roads and the construction of a new road from Stove Pipe Wells to Cottonwood Canyon. In addition camp grounds will be extended and improved and additional roads and trails built to outstanding natural and historical features.

At the administration center a new headquarters establishment will be built at a cost of about \$1,769,000 including a visitors center, administration offices, maintenance shops and residence for employees.

California contractors elect new officers

BEN P. GRIFFITH, formerly executive vice president, has been elected president of the Griffith Company. He succeeds his father, Stephen M. Griffith, who died July 6. Coincident with his taking over the company post, Griffith has submitted his resignation from the Los Angeles Board of Water & Power Commission on which he has served as president for the past three years.

Donald B. Weaver of Berkeley, California, has been elected vice president in charge of operations for Ben C. Gerwick, Inc., San Francisco. According to Paul G. Morken, another vice president, William J. Talbot of Orinda has been appointed chief engineer. Both Talbot and Weaver worked on the construction of the Richmond-San Rafael Bridge super-structure in California. Morken said that Kenneth D. Sylvester of Long Beach has been named as the firm's Southern California district manager.

J. A. Younger joins Don A. Younger in reactivating Younger Bros., Inc., which maintains headquarters at 25 California St., San Francisco, Calif. For the last few years, Don Younger has been active in industrial and commercial work in Central and Northern California. J. A. Younger served as vice president and general manager of Bishop, Younger, Bradley Co. Originally established as Younger Bros., Inc. in 1937, the name of the construction firm was changed during Younger's absence and has not been used again until this time.

Nine-Mile Dam bids

BIDS WERE RECEIVED late last month for exploratory drilling at the site of the Nine-Mile Prairie Dam which will be built by the Bureau of Reclamation. Project site is about 40 mi. east of Missoula, Mont., and the dam is considered to be part of the Blackfoot River Project.

The work resulting from this bidding will be relatively small and will be carried out in a 60-day period but indicates the start of active field work at this location.



EXPANSION AT CALAVERAS CEMENT PLANT

The 30-ton Lorain cranes lift into position a 42-ton pre-cast, reinforced concrete girder used in the construction of a new building for the Calaveras Cement Co. at San Andreas, Calif. The job is part of the company's \$4,000,000 expansion program. All the buildings are constructed by the tilt-up method. The slabs weighed up to 18 tons. The Lorains later installed an 11 x 360-ft. rotary kiln, a 9 x 25-ft. Macey finish mill, an A-C air quench cooler, a 9 x 9-ft. Macey mill, a 16-ft. Sturtevant Separator.

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- An entirely newly designed Carrier—28' 6" long, 122" wide—longer, heavier, stronger.
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- Removable rear counterweight for road weight reduction.
- Gas or Diesel Turntable Engines.
- Hydraulic Coupling—also Torque Converter Power Take-off.
- "Shear-Ball" mounting — no rollers, no center pin, no adjustments.
- 3-position Turntable mounting plate—adjustable for digging ranges or maximum crane capacities... can travel with heavier loads over the rear.
- Fully air-controlled 2-lever "Joy Stick" operation available.
- New, heavier duty hoist clutch, 2-piece design.

BOOM FEATURES

- Alloy steel, square-tubular-chord boom—lighter, stronger, more capacity... longer booms (up to 110 ft.).
- Pin-connections — easy, fast, simple. Boom may be folded for shorter travel length.
- Tip-extensions—2-piece, 20' design, extensible to 30, 40 ft.
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- Booms with extra wide bases available for extra long boom service (up to 130 ft.—170 ft. with tip).

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Alaska work scheduled

ARMY AND AIR FORCE construction work of \$40,000,000 total is being scheduled for placement under contract during the next six months by the Alaska District, U. S. Army Corps of Engineers, it was announced by Colonel L. L. Haseman, Acting District Engineer.

The announcement came with the release of the publication "Advance Information For Bidders"—a semi-annual listing of proposed defense construction projects for Alaska. The booklet contains a listing of 41 separate projects expected to be advertised to contractors for bids during the first half of fiscal year 1957—July through December, 1956.

Alaska's three major Air Force

bases—Eielson, Ladd and Elmendorf—combine the heaviest concentration of the new work. Eight projects totaling \$11,000,000, and including 250 units of family housing, are slated for Eielson. Nearby, Ladd AF base is the site for four projects totaling \$5,500,000. Elmendorf has six of the listed projects totaling \$4,000,000.

The remainder of the work is at scattered locations throughout Alaska and includes a \$14,000,000 proposal for the construction of eight military installations of a classified nature. Also listed are five trailer courts along the Haines-Fairbanks pipeline route—added housing for operating personnel—and eight Tacan (tactical air navigation) facilities.

Montana road work to double in next 3 years

THE AMOUNTS of money to be spent on highway construction in Montana during each of the next three years will be almost double the present rate of annual expenditure as the result of the recently approved Federal Highway Act, Scott P. Hart, state highway engineer, predicts. He estimates that the state will need at least \$12,000,000 to match federal highway aid in the next three years.

Engineer Hart said the State Highway Commission had planned a road construction program amounting to about \$23,000,000 this year under the former federal-state matching arrangements. He believes the program for this construction season may now be increased to about \$42,000,000.

Under apportionments announced at the end of June by the Commerce Department, Montana could qualify for \$1,983,416 for primary, secondary and urban highway construction on a 50-50 matching basis and for \$14,364,040 for interstate systems on a 91.4-8.6 matching basis during the fiscal year that began July 1.

Montana has 1,243 miles of highway classified as interstate, constituting 21% of the state's primary system and carrying 42% of the state's highway traffic.

At the dedication ceremony of the \$2,000,000 four-lane highway under construction west of Butte in July, Governor J. Hugo Aronson said that the State hopes to match the full amount of federal funds as the program progresses. The \$618,744,000, 13-year program planned for Montana under the new highway bill, Governor Aronson said, includes \$442,967,000 in federal funds and \$175,777,000 in state matching funds to meet federal obligations and take full advantage of the expanded government program.

Another Nike project

ANOTHER million dollar Nike guided missile site is under construction near the Hamilton Air Force Base in Marin County, Calif. The project will include a control center at a nearby location. Low bid for the project submitted to the Corps of Engineers came from Price-McNemar Construction Co. of Sepulveda, Calif., on a bid of \$1,299,570. This organization has constructed eight of these Nike sites in the Los Angeles area.

Construction will involve the building of roads to the two locations, construction of the launching platforms, excavation for missile storage in addition to barracks, administration building and accessory structures. Construction time is eight months.

"OUR HIAB CRANE DOES EVERYTHING"

Says DON L. ROSS,
General Manager

THOMAS CONSTRUCTION CO.
Fresno, California



AGC member Thomas Construction Co. is hard at work building bridges, roads, and other highway structures in Central California as part of the area's expanded road-building program. Several months ago, the company purchased a HIAB Truck Crane for loading and unloading timbers, and setting false-work in bridge construction.

"The HIAB Crane does everything we purchased it for," reports Mr. Ross. "We have it mounted so it can be operated from the cab or bed. We use it in timber work, and also for loading other trucks. It's especially easy to operate. We've had no trouble with it, and we don't expect any. There isn't too much to wear out."

Thomas Construction Co. has mounted their HIAB Crane on a front and rear dual wheel equipped 4 x 4 truck which can work in muddy and sandy places. Operator Eddy Hunsaker says, "I helped put this HIAB Crane together and mount it on the truck. It's simple to assemble and install, and very easy to operate. I learned to operate the HIAB in no time at all."

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- Proper carburizing permits securing and permanently holding the desired tension in high-strength structural bolting. Uniformity of hardness is assured by absolute grain-size control.

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- MIL-CARB Washers are flat and smooth, dimensions conforming to current requirements for heavy plain washers (carburized) of the American Standards Association (ASA Designation: B27.2). These washers are available in six sizes, from $\frac{5}{8}$ " to $1\frac{3}{8}$ ", packed in 200-lb. kegs.

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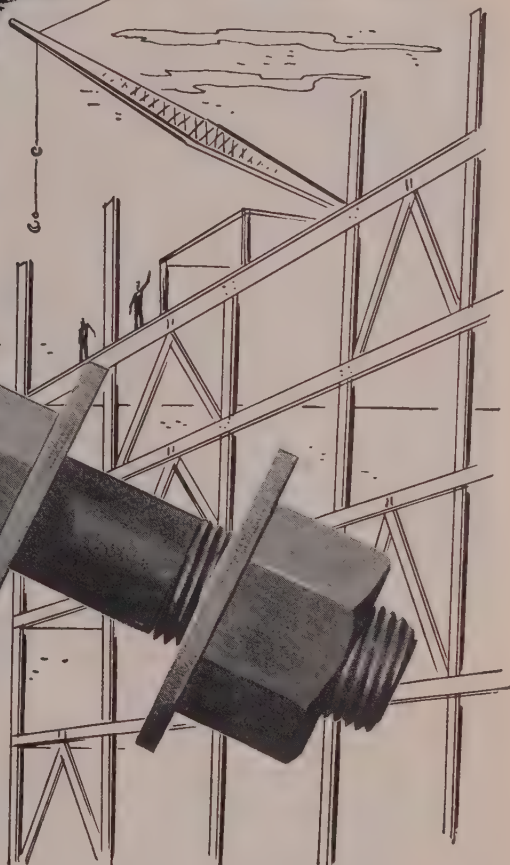
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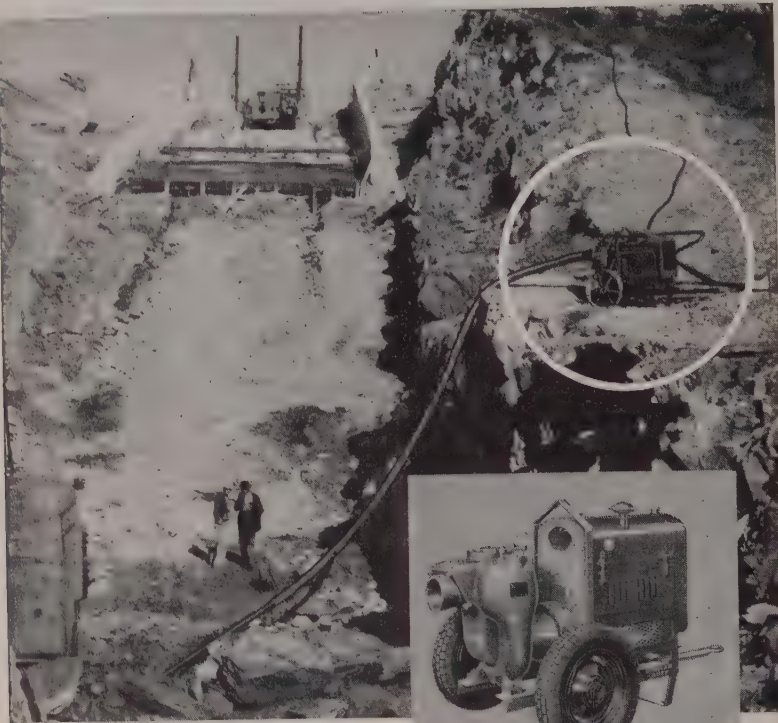
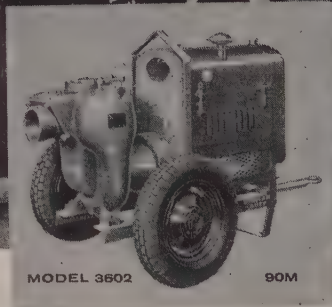


Photo by Jerry Pratt, Constructioner



Near Spring Grove, Pennsylvania, a 1,100,000,000-gallon earth dam is being constructed for P. H. Glatfelter Co., producers of paper, by Central Pennsylvania Quarry, Stripping and Construction Co. Seepage in the spill-basin is quickly removed by a Gorman-Rupp 90M Pump, Model 3602, letting work proceed on the re-

moval of solid rock. The pump stands about 20 feet above water level and is discharging over the rise, as shown in the upper right of the picture. The 500-ft. spillway chute handles overflow from the 2½-sq.-mile dam.

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Rocky Reach hydro site gets Federal license

THE FEDERAL POWER COMMISSION has issued a 50-year license to Public Utility No. 1 of Chelan County, Wash., of Wenatchee, Wash., for its proposed Rocky Reach hydroelectric project on the Columbia River in Chelan and Douglas counties, Wash.

The project is estimated to cost \$200,000,000 exclusive of transmission lines. It will be located, together with the proposed adjacent upstream Wells project, in the undeveloped stretch of the Columbia River between the Rock Island project and the upstream Chief Joseph project.

Since the proposed Rocky Reach project may affect the tailwater of the proposed Wells project, the Commission included a condition in the license to recompense the future owner of the Wells project for losses due to encroachment by the Rocky Reach project. The FPC in September of 1954 issued a preliminary permit to Public Utility District No. 1 of Douglas County, Wash., for the proposed Wells development.

The proposed Rocky Reach project will include a concrete gravity dam having a 750-foot gated spillway section, an intake and powerhouse section about 1,080 feet long, and non-overflow sections at the abutments and between the spillway and powerhouse. The dam would create a reservoir extending about 43 miles upstream.

The powerhouse would have an initial installation of seven units, with each turbine rated at 127,000 hp. and direct-connected to a generator rated at 90,000 kw.—for a total installed capacity of 889,000 hp. and 630,000 kw.

In a concurrent order the FPC permitted the Departments of Fisheries and Game of the State of Washington to intervene in the proceeding. The Departments have recommended inclusion in the license of certain conditions relating to fish and wildlife resources. The FPC said that while the license does not include all the conditions recommended by the Departments, it was reserving the right to include additional conditions upon further recommendation of the interested state and federal agencies after notice and opportunity for hearing.

Course for contractors

A COURSE to inform contractors, subcontractors, engineers and architects of their legal rights and liabilities has been set for fall opening at U.C.L.A. by University Extension with Gordon Stator, attorney and general counsel for the Building Con-

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tractor's Association of California, as instructor. The course in Practical Application of Law to the Construction Industry will meet for nine weekly sessions on Wednesdays from 7 to 9:30 p.m., in room 160 of Royce Hall starting September 12. Planned for September 11 opening is a course in Patent Law for Engineers and Scientists, which will meet at the Extension Center, 813 South Hill Street in Los Angeles.

Registration for both is being accepted at University Extension offices at either location, where information folders on all fall adult courses may be had on request.

Contract awarded for Casitas Dam

AN \$8,576,388 Bureau of Reclamation contract for the construction of Casitas Dam, a major feature of the Ventura Project in California, has been authorized for award to the Winston Bros. Company of Monrovia, Calif. Secretary of the Interior Fred A. Seaton said that the action was taken within a few hours after the President signed the 1957 Public Works Appropriation Bill making funds available.

Initiation of construction of the Ventura Project this summer—at

least a year earlier than might otherwise have been expected—was made possible by unusual cooperation and teamwork by the water users, the Congress, Bureau of the Budget, and the Bureau of Reclamation, Secretary Seaton said. He described it as an excellent example of partnership. The water users completed a repayment contract at approximately the same time that Congress passed authorizing legislation.

The Ventura Project, about 60 miles northwest of Los Angeles, will supply urgently needed municipal and industrial water as well as water to irrigate about 12,000 ac. The water users actively supported the project and advanced \$700,000 to the Bureau of Reclamation in 1954 for preconstruction and design work.

A repayment contract to return the costs of the project to the Federal Government was executed by local water officials last March. The contract is for a maximum of \$27,500,000. The Bureau of Reclamation's feasibility report on the project showed anticipated direct annual benefits of \$1,809,000 and secondary benefits of \$2,565,000. The water users will repay the cost of the development within 40 years.

The Ventura River watershed constitutes a relatively small area draining a rugged mountainous region close to the city of Ventura on the coast. The absence of snowpack in the mountains and a wide variation on both monthly and annual rainfall results in fluctuating streamflows and occasional drought.

The Bureau has allowed 900 days for completion of the 285-ft. high Casitas Dam, an earthen structure about two miles upstream on Coyote Creek from its junction with Ventura River which will provide some 250,000 acre feet of storage capacity. Other contemplated structures include Robles Diversion Dam, a rock fill structure on Ventura River to divert additional water into Casitas Reservoir; and a main conduit system (including seven pumping plants) to take water to elevations higher than the reservoir. The estimated cost of the Ventura Project is \$27,600,000, including \$100,000 for minimum recreational facilities which is nonreimbursable.

The construction contract goes to the Winston firm, the lowest of eight bidders. Second low bidder, with an offer of \$8,863,764, was the joint venture of Green Construction Company and S. Birch & Sons Construction Company of Des Moines Iowa. A \$9,174,038 bid by the Mitty Construction Company of Los Angeles, California, was third low. The engineer's estimate for the job was \$8,388,009. The eight bids ranged upward to \$12,876,543.



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Another power unit to start at Chief Joseph

CHIEF JOSEPH DAM'S fifth 64,000-kilowatt generator was scheduled to go into operation August 8, according to the Seattle District, Corps of Engineers, U. S. Army.

Other tests included voltage build-up on the generator, voltage build-up on the transformer, and tie-in with the Northwest Power Pool for voltage and load build-up.

This is the power unit which originally was scheduled to go on the line at Mar. 1, but was delayed by the strike at the Westinghouse plant where the Chief Joseph Dam generators are being manufactured. However, Aug. 8 is 17 days ahead of the Aug. 25 "target date," set after the strike ended, for the generator to go on the line, according to Colonel J. B. Page, District Engineer.

The first three power units at Chief Joseph Dam began producing commercially Aug. 20, 1955, and the fourth went on the line Nov. 16 last year. Target date for the sixth generator in production is Oct. 15 this year, and the seventh in December, the eighth in February and the ninth in March 1957, Colonel Page said.

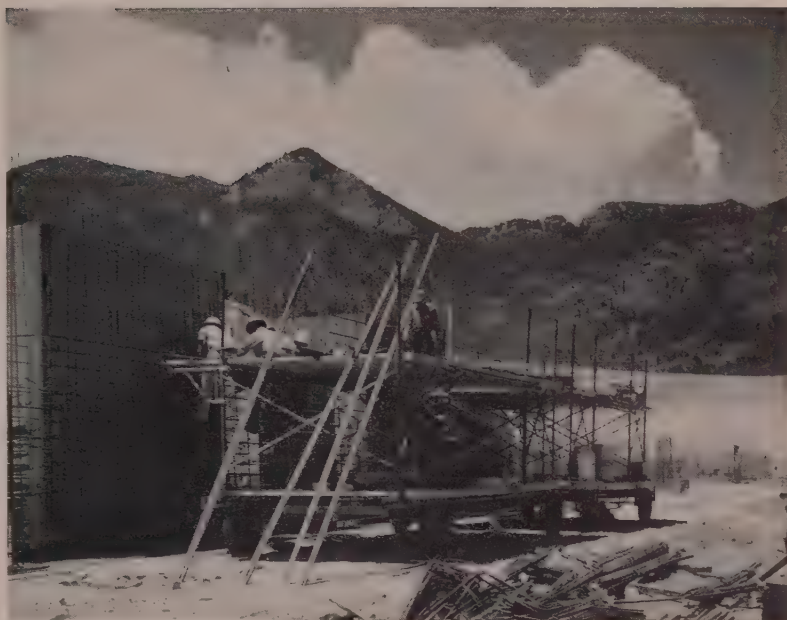
The initial power installation at Chief Joseph Dam, on the Columbia River near Bridgeport, Washington, will consist of 16 turbines and generators, which are scheduled for completion by the end of 1958. Plans call for four more later, then eventually an additional seven, for an ultimate total of 27.

License board elects new head in California

GLEN HICKMAN, Los Angeles, plumbing contractor, was elected chairman of the Contractors' State License Board for the 1956-57 fiscal year during the regular quarterly meeting of the Board held in Los Angeles.

Hickman has served on the Board since February 22, 1952, when he was appointed to fill an unexpired term. He was reappointed January 15, 1953, for a full four year term.

H. Earl Parker, general engineering contractor of Marysville, was elected Vice-Chairman of the Board. Parker has served as a Board member since January 18, 1952, and was appointed in 1955 by Governor Wright. A past president of the Northern California Chapter of the Associated General Contractors, Parker has been active in many of its programs for the betterment of the construction industry. He has performed work on many large levee projects in the Tulare Lake Basin and the Sacramento River.



WORK WAGONS AID IN WALL CONSTRUCTION AT AIR FORCE ACADEMY

Mobile work wagons, described on page 40 of the July issue of *Western Construction*, are now in use at the site of the Air Force Academy near Colorado Springs, Colo. The rigs were developed by Long Construction Co. for their subcontract on 550,000 sq. ft. of retaining walls. General contractor for work in the cadet-academic area is T. F. Scholes, Inc. Two more levels will be added to the work wagons for higher parts of the walls. Plastic-coated Symons forms totaling 25,000 sq. ft. are being used.



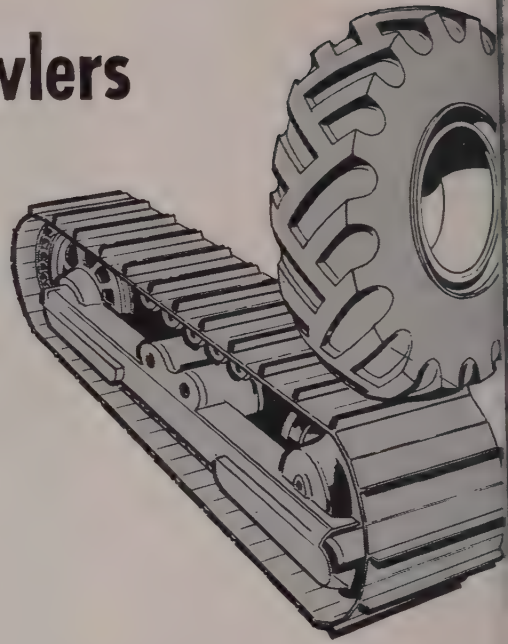
PORTABLE BATCHING PLANT REDUCES TRUCKING ON UTAH PROJECT

Batching plant on wheels saved constructing a stationary plant at job site to supply concrete for Weber Basin water treatment plant, reports Clarence Waterfall Co., contractor of Ogden, Utah. Specifications requiring concrete be placed within 45 min. after water is added prohibited supplying from base plant 4 1/2 mi. distant. Noble-Mobile batching plant was set up at the site. Produces the 6,500 yd. required for the job at 60 yd. per hr. The short haul reduced the number of mixer trucks required. Extensions to aggregate bin and cement silo provide total storage of 80 tons aggregate and 2,000 cu. ft. of cement. The plant was supplied by The Noble Company, Oakland, Calif.

There's a place for crawlers and a place for rubber

in meeting your dirtmoving problems.

1. Larger job yardage
2. Increased job area
3. Earlier completion dates
4. Higher labor costs



Crawler tractors fit your applications where lugging power is a maximum requirement. They have maximum efficiency in limited-area operation. Here their traction advantage at low speeds can offset their speed limitations on medium or long-range cycles.

Rubber-tired tractors fit your applications where speed and mo-

bility become important dimensions in your dirtmoving problem. The longer your cycle the greater the importance of speed that only rubber-tired tractors can give. You also need rubber-tired mobility where frequent moves from one assignment to the next, or from job-to-job, are involved. Where you have long cycles and/or frequent moves, crawler limita-

tions give you a severe handicap in both time and cost.

With over ten years of experience and development behind it, our improved rubber-tired Tournatractor, can meet your need for dependable performance, with a minimum of competent regular maintenance. Operation is easy and safe. When inspection or

Filling around large culvert, 17 mph rubber-tired tractor moves dirt fast. Tournatractor's travel speed and flexibility of application enables you to expedite scattered job assignments that need to be done in a hurry.



are necessary all parts are accessible and can be re-d quickly and simply.

e a new look at the modern ntractor. Study it from the e of your assignments where need new standards of speed mobility. Remember, these dimensions will become even important in the big high-programs ahead. Study your ler cycles, but not just on of the biggest load in the est distance. Measure in rather than *distance*. Meas-load-time, carry-time, return- Find out the percentage of you lose in moving from one nment to the next.

measure production on your ers, your shovels, your pav-your drills. It's also import-or you to carefully study the major tool you've probably n for granted . . . your trac-To be sure, yardage measure-s are impossible on most of production . . . but you can itely time their moves and s over a substantial period; our advantage.

l be glad to help you set up e studies if you wish. Then, a you know just what you now getting in tractor per-ance, we'll be glad to show time-study man similar ations on Tournatractor. We k the answers on the present-Tournatractor will justify trying at least one on your ent jobs. Time-studies on as-ments calling for speed and ility will show you a big ad-age in productive time . . . e work done . . . lower costs greater profit.

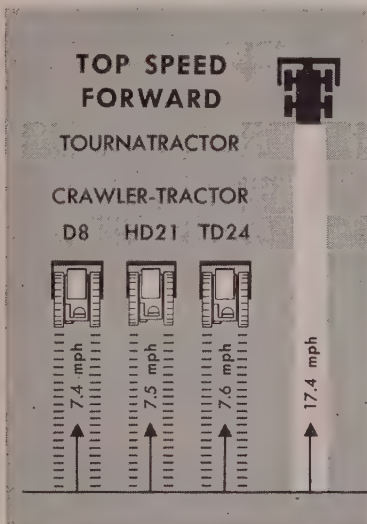
don't take our word for it . . . k for yourself.

tractor—Trademark Reg. U.S. Pat. Off. CT-1103-G



Push-loading is an important job where rubber-tired speed pays off. Tournatractor's ease-of-operation and maneuverability allow fast positioning,

gear-shifting is faster, new optional wide-base tires plus hydroflotation give improved performance. Mobility permits pusher transfer to match loading need.

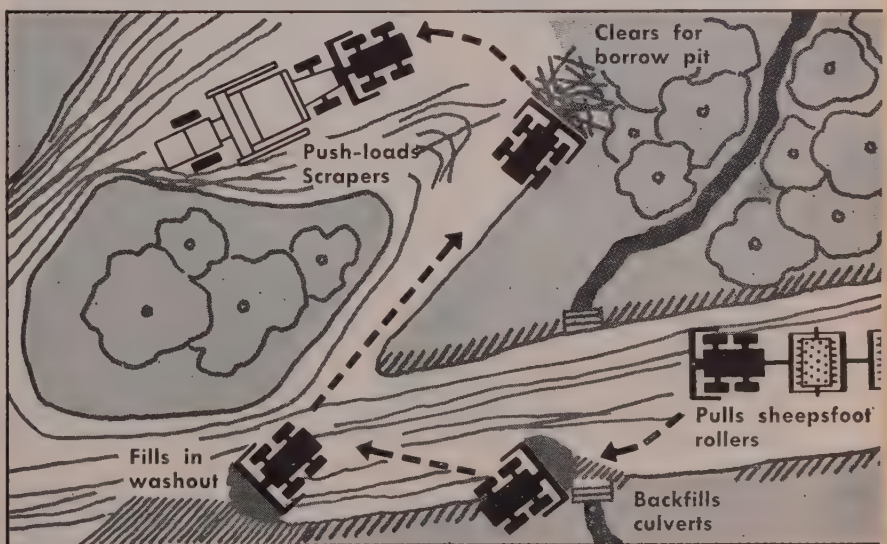


Tournatractor travel-speed advantage is shown above. Chart compares Tournatractor's top speed with those of 3 crawler-tractors in its size range. Diagram below shows why EVERY spread needs at least one Tourn-

Figures computed from manufacturers' specification sheets available to us at time of printing.

Work	Operation	Time (minutes)		
		Average Crawler	Rubber-Tired Tractor	Speed Saved in Min.
Dozing	Pushing load . . . 150 ft.	0.86	0.57	
	Return . . . 150 ft.	0.36	0.21	
	Gear changes	0.30	0.10	
	TOTAL	1.52	0.88	0.64
Pulling 15-yd. Scraper	Loading	0.75	1.25	
	Hauling 1000 ft.	2.10	0.76	
	Spreading	0.40	0.40	
	Return 1000 ft.	2.10	0.63	
	Gear changes	0.30	0.10	
	TOTAL	5.65	3.14	2.51
Push-loading	Loading	0.85	1.10	
	Return	0.42	0.21	
	Gear changes	0.30	0.10	
	TOTAL	1.57	1.41	0.16
Pulling 20,000# Roller	600-ft. cycle travel . .	3.40	2.72	
	turns	0.30	0.30	
	TOTAL	3.70	3.02	0.68

tractor as a trouble-shooter. In less than 5 minutes this 17 mph rig can be at work on a new task a mile down the right-of-way. It can handle 9 one-hour assignments averaging a mile apart in a single 10-hour day.



LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

Land withdrawal to aid Flaming Gorge Project

A TOTAL of 19,414 ac. of public lands in Utah have been withdrawn for possible use in connection with the Flaming Gorge Dam and Reservoir of the Colorado River Storage Project, Secretary of the Interior Fred A. Seaton has announced.

Two reclamation withdrawals are involved. The larger, for 17,454 ac., is entirely within the Ashley National Forest. The lands are needed for construction materials, campsites, roads and other uses in connection with construction of dam and reservoir.

The second withdrawal is for 1,960 ac. of public domain with the boundaries of Utah Grazing District No. 8. The area is needed for possible use in construction of the Flaming Gorge Reservoir. The Bureau of Land Management, which concurred in the withdrawal, will administer the lands for grazing purposes until they are needed by the Bureau of Reclamation. Reclamation withdrawal reserves the lands from entry or disposition under the various public land laws—including mining location but not including mineral leasing.

Flaming Gorge Dam and Reservoir constitute a major feature of the newly authorized Colorado River Storage Project. The 450-ft.-high concrete dam will be on the Green River, a major tributary of the Colorado, in northeastern Utah.

Bureau of Reclamation program outlined by individual projects

DETAILS of a \$174,000,000 construction program which will be undertaken by the Bureau of Reclamation during this fiscal year ending June 30, 1957, were completed at a conference of Commissioner of Reclamation W. A. Dexheimer with regional directors in Denver. Construction and rehabilitation work will be financed with \$144,225,500 in new funds and an unobligated balance of \$29,000,000.

Ten new starts on new projects, or new units of projects already under construction are included in this year's program. These are: Colorado River Storage Project—Glen Canyon Dam on the Colorado River in Arizona; Flaming Gorge Dam on the Green River in Utah, and Navajo Dam on the San Juan River in New Mexico; Casitas Dam and other phases of the Ventura Project in California; Washita Project in Oklahoma; Talent Division, Rogue River Project in Oregon; Collbran Project in Colorado; additional power facilities, Colorado-Big Thompson Project, Colorado; hydroelectric plants, Weber Basin Project, Utah, and the Freemont powerplant, Glendo Unit, Missouri River Basin Project, Wyoming.

Work to be accomplished this year will result in 57,900 kw. of generating

capacity being placed in operation by June 30, 1957. The bulk of the irrigation facilities to be completed will supply additional water for acres not under cultivation but having an insufficient supply.

Programing details for individual projects in the 11 Western states follow:

Gila Project, Arizona. \$1,321,074 for substantial completion of the Mohawk Unit Laterals and other features of the Wellton-Mohawk Distribution System, which will provide irrigation water for an additional 11,965 ac. during the fiscal year.

Palo Verde Diversion Project, Arizona-California. \$3,317,294; for continuing construction of Palo Verde Diversion Dam, a rock and earth-fill structure on the Colorado River to provide diversion of river water into the irrigation system of the Palo Verde Irrigation District, replacing a temporary rock weir completed in 1945. Levees and drains, in Colorado Indian Reservation, 22 mi. long on the Arizona side and 8 mi. on the California side are also being constructed. Contracts for dam construction were awarded in January and February 1956. The project includes a \$500,000 loan to the irrigation district for modification of its works to conform to the new dam.

Parker-Davis Project, Ariz., Calif. Nev. \$556,439; for Parker-Davis Dam Project to enlarge various sub-stations under wheeling agreement with Arizona Power Authority. Completion scheduled for fiscal year 1958.

Boulder Canyon Project, Arizona-Nevada. \$252,000; to award contract for the purchasing of generating equipment for Unit N-8, the last generator to be installed in Hoover powerplant.

Cachuma Project, California. \$426,000; for completion of South Coast conduits and Goleta and Carpinteria lateral systems, and initiate and complete irrigation headquarters—including office, shop and storage. This will complete all work on the project which serves 26,900 ac. of irrigated land and provides 10,300 ac. ft. for municipal and industrial water.

Santa Maria Project, Calif. \$5,298,000; for construction of Vaqueria Dam and Reservoir; acquisition of right-of-way, reservoir clearing, and highway relocation. Construction contract for dam was awarded in June 1956. When completed, the project will supply supplemental irrigation water to 35,700 ac. and furnish supply to 3,000 ac.

Solano Project, Calif. \$11,161,000; completion of Monticello Dam and Putah Diversion Dam. Also right-of-way acquisition, clearing and highway relocation. The project will ultimately

(Continued on page 156)



ANALYZING DEFENSE BIDS IN ALASKA

A reviewing board analyzes some of the complicated bids which run into millions of dollars for construction supervised by the Alaska District Corps of Engineers for the Army and Air Force. L to R: R. E. Lee, engineer control branch chief; D. V. Cronin, supply division chief; and Carl L. Knutson, technical control and inspection branch chief. Some of the highly competitive bids have various schedules and interested firms often include various stipulations and qualifications in their bids. This board of three studies every phase of each bid before recommending it for final contract award. Awards are made in best interest of the government.

Dumps anywhere—over-the-edge or on-the-move

Tournapull Rear-Dumps can dump anywhere—on or off-the-highway to place loads exactly wherever you want them.

To dump over the edge of bank, all you do is back close to dump point. The big single tires and power steering get you over rough footing and soft ground where many trucks can't go. Dump is made by flicking electric switch on control panel. This instantly activates hoist motor. Body "locks" back easily over rear axle. You have power up and power down. Movement is under positive cable control at all times, can be stopped at any angle. At full dump angle, bowl lip is at ground level *behind* rear wheels. This position prevents material from rolling forward under wheels. It also provides free dump over edge of bank and greatly reduces need for dozer cleanup.

Safe at all times

In dumping, Tournapull Rear-Dumps are safer than any truck. Front-wheel-drive keeps power and traction on solid footing well ahead of rear

Body dumps back between wheels — note low center of gravity

Electric hoist powers body up and down. Smooth, easy, no shock

In full dump position, floor of bowl is at 63° angle

Disc brakes hold wheels safe while load dumps clear of bank

wheels. Because body does not need to clear frame, springs, axle, or differential, its center of gravity stays low, even during dump. Oversize multi-disc air brakes—with *more braking surface on one wheel than comparable-size trucks have on all four*—prevent creeping or rolling.

Separate braking of front and rear wheels can be used with action of hoist to help front wheels pull away from edge of soft dump. In case of trouble, rear brakes are set, front brakes released. When bowl is lowered from normal dumping position, free-rolling prime-mover wheels are pushed forward. On the "C" size Rear-Dump, they move 6½ ft. — usually enough to find good footing. If front drive wheels do not reach good footing after bowl is lowered, same "leap-frog" process can be repeated. Simply pull rear wheels forward by setting front brakes and raising bowl, then set rear brakes and push front wheels ahead by lowering bowl.

Accurate spreads while moving

Tournapull Rear-Dumps can also spread on the run. Bowl can be safely raised and lowered at normal haul speed. Operator simply positions bowl for desired flow of material and continues to drive.

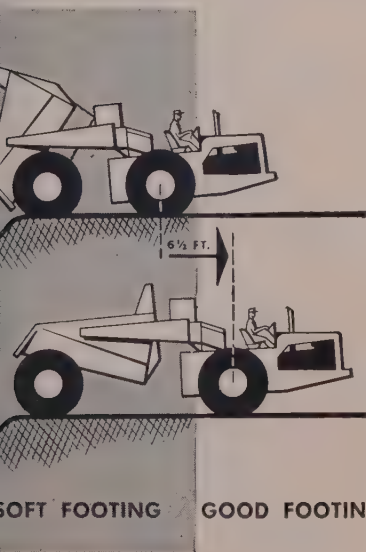
There's a Tournapull Rear-Dump size to fit your needs

(Now available with optional tailgate)

"D"	"C"	"B"
11 TONS	22 TONS	35 TONS
138 HP	208 HP	293 HP

Prime-movers for these Rear-Dumps also power scrapers, bottom-dumps, flatbeds, and cranes.

Tournapull—Trademark Reg. U.S. Pat. Off. R-778-G-bw



LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

ENGINEERS on the move

Gerald Ulett of Albany, Ore., has been appointed city engineer of Pendleton, replacing Arch French, who has moved to Toledo, Ore.

* * *

Robert W. Beal, formerly of Parkdale, Ore., has been named director of development at the Corps of Engineers' research and development laboratories at Fort Belvoir, Va.

* * *

George E. Zorger, formerly in the technical control branch in the Alaska District Engineers office at Anchorage, where he was a specialist



in soils and airfield paving, is now in the district engineer's office at Huntington, W. Va., as supervising civil engineer in the specifications department.

* * *

H. L. Royden, contractor of Phoenix, Ariz., is the new president of the Western Chapters' Conference, Associated General Contractors of America. He was elected at the recent semi-annual meeting in San Francisco. This Western conference consists of AGC Chapters throughout the eleven Western states.

* * *

D. L. Cheney was recently elected president of Alaska Chapter, Associated General Contractors. P. D. Koon was elected vice president, and W. R. Johnston, secretary-treasurer.

* * *

Richard T. Hadley is now associated with Mayfair Construction Co., Los Angeles.

Donald H. Slater, contractor of Chico, Calif., was recently elected president of the newly formed Valley Contractors Exchange. Frank M. Booth was made vice president, and Ray H. Griffin, secretary-treasurer.

* * *

E. M. "Matt" Gordon has joined Penta Construction Systems, Inc., South Gate, Calif., as general manager. A graduate civil engineer, Gordon has had ten years experience in the construction industry. Raymond Utin was appointed construction manager.

* * *

Marc C. Fosgate, assistant district engineer—operations, for District X of the California Division of Highways, retired recently after 36 years of state service.

* * *

Emmett J. "Woody" Woodward, Jr., recently joined Industrial Asphalt as its chief engineer working out of the general office at 1100 So. Beverly Dr., Los Angeles. Woodward has previously worked for Stone & Webster Engineering Corp., O. J. Potter & Co., Filtrol Corporation, and Sully-Miller Contracting Co.

* * *

The assignment of Brig. Gen. David W. Heiman as Acting Assistant Chief of Engineers for Military Supply has been announced. General Heiman will replace Maj. Gen. William C. Baker, recently assigned elsewhere.

* * *

Col. David S. Parker, assistant district engineer with the Portland District, Corps of Engineers, has left that position to attend a 10-month Army War College course at Carlisle Barracks, Pa. Col. Parker came to the Portland District in September 1954 as executive officer to Col. James U. Moorhead, then district engineer. He was named assistant district engineer in August 1955.

* * *

On duty as Assistant City Engineer of Palos Verdes, Calif., is Fred Ervin. He will assist City Engineer G. B. Snelgrove who will continue to serve in a part-time category.

* * *

Jean R. Walton has been selected by the Bureau of Reclamation as construction engineer for Flaming Gorge Dam in Utah, one of the three construction "starts" this year on the Colorado River Storage Projects.

Maj. Gen. Thomas M. Robins USA, Ret., of Portland, Ore., is one of five men elected to honorary membership in the American Society of Civil Engineers. Gen. Robins was graduated from West Point in 1904. As Division Engineer for the Army in Portland his supervisory duties included construction of the Bonneville Dam. In the Office of the Chief of Engineers from 1939 until his retirement in 1945, Gen. Robins was executive agent in supervising the largest civil engineering force under one control ever assembled. He has been a consulting engineer in Portland since retiring from the Army.

Certificates of Honorary Membership will be conferred on Oct. 17 at the Society's national convention in Pittsburgh, Pa. At that time, awards also will be presented for outstanding technical papers published by the Society in the past year. Among those honored will be John Hugh Jones, University of California, Berkeley; Herbert Horonjeff, Lafayette, Calif.; and Allen J. Curtis, Culver City, Calif.

* * *

Lt. Col. Richard L. Hennessy, CE, has been assigned as resident engineer for Elmendorf AFB, coming from the Office of the Chief Engineers. Hennessy's new assignment places him in charge of all defense construction at Elmendorf, heading the field staff which supervises current construction on the base amounting to more than \$56,600,000.

* * *

Leo M. Buhr has been appointed chief of construction and operations of the Corps of Engineers' North Pacific Division. From November 1948 to May 1951 he was with the Walla Walla District, transferring to the North Pacific Division that summer. He left the Corps to go with the AEC at Portsmouth, Ohio, in 1953, where he has been until again joining the Engineers in the Northwest. Buhr succeeds the late Samuel G. Neff, who died last May while on an inspection trip to Montana.

* * *

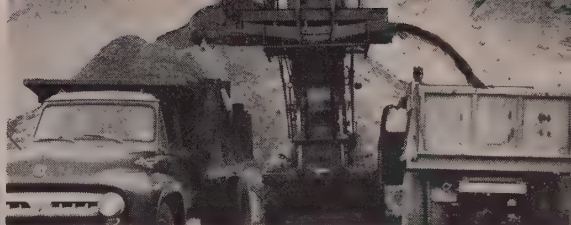
John E. "Jack" Cooney, construction superintendent for the Pacific Gas and Electric Co. on many large hydroelectric projects in California, recently retired from the company. In 35 years as a construction engineer with PG&E, Cooney has been superintendent in charge or has participated in the building of projects on the Pit, Feather, Mokelumne, Stanislaus, Kings and other California rivers. At his retirement he was superintendent for construction of the Kings River Project, where he is succeeded by George B. Thacher.

* * *

J. P. Dunnagan, engineer of bridges for the Southern Pacific since 1942, recently retired after more than forty years with the railroad. He is being replaced by Victor R. Coolidge, assistant bridge engineer.

Traveloader loads up to 600 yards per hour from stockpiles... moves materials fast to fill orders for material of various specifications... keeps big truck-fleet working steadily.

Cross-conveyor (optional), shiftable left and right, directs material to trucks at either side... speeds loading, cuts positioning time, balances load.



passing traffic... loads excess material from streets and between foundations in subdivisions.

STRIPS TOPSOIL: Traveloader cuts and loads topsoil and other materials from field or natural bank without prior preparation.

These features cut your costs:

Power feeder on Traveloader gathers material from a width of 8' and places it on conveyor belt. Machine has 5 working speeds, 0.29 to 1.9 mph... travel speeds to 26.7 mph. Conveyor discharge height is adjustable from cab for filling trucks of any height without spillage... without excessive dust. Traveloader heaps trucks at its rear, or with optional cross-conveyor, at either side... evenly distributes full load for fast over-the-road haul.

Cab is centered over conveyor—out of the dust zone—where visibility of material, feeder, conveyor, and trucks is good. Positive, convenient controls make loading simple... maneuvering and traveling as easy as driving a truck. Traveloader is powered by either 55 hp gasoline or 60 hp diesel engine, machine weighs 16,700 lbs.

See Traveloader at work

Make a date to see Traveloader in action. See it load at the rate of a truck-a-minute (including truck positioning time). That's the best way to appreciate its money-making possibilities on your work. Write or phone us for the names of users working Traveloader on projects similar to yours.

Cut truck-loading costs!

Speed handling of aggregates, loose dirt, topsoil with fast-loading Traveloader

What is it costing you to load aggregates, surplus dirt, and other loose materials into trucks? Are you loading fast enough to keep your haulers busy? ... to keep ahead of pavers? ... to keep your jobs on schedule? You may find it worthwhile to re-examine your truck-loading methods carefully, then figure out where you might save time and money with a high-speed, rubber-tired Adams Traveloader.

... rail-heads, for transport to ready-mix plant or job. Machine reduces truck waiting time... loads trucks in 40 to 60 seconds... moves and maneuvers quickly from one job to another at loading site... travels fast between plants and yards.

LOADS SURPLUS DIRT: Traveloader picks up windrowed dirt in continuous motion, without scattering material. It works on road shoulders, loading to the rear... does not interfere with

Handles big yardage fast

Traveloader loads a truck in less than a minute from windrow, stockpile, or bank. It loads up to 600 yards per hour of dirt, sand, gravel, crushed stone, slag, topsoil, cinders, snow, and many other non-packed materials.

Here are a few typical applications where mobile Traveloader heaps trucks faster at lower cost:

LOADS AGGREGATES: Traveloader handles materials from stockpiles at aggregate plants, in materials yards, or



Traveloader digs and loads topsoil, sand, gravel, and other materials from natural bank without prior preparation.



Making clean 8' wide pick-up, Traveloader loads surplus material windrowed on road shoulder, without interference to passing traffic.

AL-1105-H-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

SUPERVISING the jobs

Clarence Young, superintendent, Earl Latham, resident engineer, Tony Landers, carpenter foreman, and Chris Kinzel, master mechanic, are key men on construction by Thomas Construction Co. of a flat slab bridge and .5 mi. of grading and surfacing in Mendocino County, Calif. Going since April, work will end about October. Bid price was \$131,722.

* * *

Everett J. Peters, project manager, heads the list of personnel on the \$7,500,000 award to Howard S.



Good

Peters

Wright & Co., Inc., for hangar construction (concrete) at Boeing Flight Center, Moses Lake, Wash. Assisting as superintendent is Robert Good. Project engineer is A. K. Bek. E. C. Hightower is accountant. Other key men are Don Gillis and Thomas Fleming, area superintendents. Carpenter foremen are Wayne Peters, James Van Ness, Marvin Schotte, N. V. Moen. Rudie Mackey is labor foreman.

Soule Steel Co., subcontractor, has Ray Strowbridge as superintendent and the following ironworker foremen: Mel Dunlap, Norm Hudnall and Robert Mertes. The Ballard Co. has the mechanical contract, with the following key men: Robert H. Smylie, general superintendent; Jim Kuykendall, general foreman; C. G. Robson, project engineer, and John Wallace, job engineer. Anderson-Burke has the electrical subcontract, with Paul F. Burke superintending, and Mike Lawrence, foreman. Concrete mixing is by Mount Vernon Sand & Gravel Co., "Buck" Davis, superintending. E. S. Williams is general foreman for Automatic Sprinkler Corp., subcontractor.

Virgil Graham, general superintendent, Tony Torkko, job superintendent, and Don Fraser, plant superintendent, are key men working on 16.1 mi. of grading and surfacing north of Bieber and east between Lookout and Adin, Lassen and Modoc counties, Calif. L. L. Rice & Sons, Inc., is doing the job in 75 days at \$272,124.

* * *

D. T. Lind, project manager; Glen Tey, project engineer; Gordon Robinson, office engineer; and Ralph Smith, office manager, comprise the top supervisory men on the airfield paving contract being carried out by Morrison-Knudsen Co., Inc., at the Fairchild AFB, Spokane, Wash. Other key personnel on this \$5,500,000 project are H. A. Kenyon, excavating superintendent, and H. L. Meiners, concrete superintendent;



Lind

Porter

and the following foremen: F. C. Bultman, labor; D. S. Etherton, R. H. Nau and R. Kurowski, cement finisher; J. A. Jordan and L. M. Howard, excavating; M. L. Loth, mechanic; L. M. Manning, R. H. McDonald, D. Sullivan and I. W. Weight, equipment; Master mechanics are F. A. Williams and J. F. Gessner. Plant superintendent is L. F. "Bill" Porter. R. E. Hopkins is superintendent of calibration hardstand. Work here got under way in March and will be finished probably by the end of the year.

* * *

Kenneth W. Zuidema is project manager on a \$620,192 job for James Stewart Co. consisting of construction of ordnance storage facilities at Lake Mead base, Nev. Superintendent is George Reiff, and office manager is Andrew Klotz.

R. C. Philbert and N. A. Gilliar project manager and general superintendent respectively, head the construction crew working on the over \$7,000,000 award to the contracting organization of Ferry and Crow for highway construction near Rodeo, Calif. Working here as assistant superintendent on this record fill is Story. Office manager is J. A. Breach. Ted Combett is master mechanic. W. Ferguson, C. Gentry, Rip Edwards and G. Anderson are grade foremen. Caterpillar equipment is being used 16 DW20s, 17 D8s, 4 D9s. About 15 employees are working two shifts. Project got under way in March, with finish date set for Aug. 1958.

* * *

R. W. Westfall, superintendent, I. C. Vogel, master mechanic, and J. C. Roinen, office manager, comprise R. Hensler's top men on his recent \$1,666,455 award for excavation of steam plant site and improvement to Vista del Mar and Coast boulevards, El Segundo, Calif. This is a 450-day contract which started June 20.

* * *

E. L. Williamson, superintendent, had the assistance of Darrell Hall, grade foreman, and C. R. Williamson, labor foreman, on a grading and surfacing job for R. A. Farish Co. Work is being done on a 4.9-mi. stretch of the Mariposa road, San Joaquin County, Calif., at \$240,583. M. J. Ruddy & Son is sub on plant-mix surfacing.

* * *

George Williams, is project superintendent, and H. J. McCue, general superintendent, on grading and surfacing of 3.5 mi. of highway near Brown's Valley, Yuba County, Calif. Souza & McCue Construction Co. is doing the work at a cost of \$153,507 and has scheduled it for completion in September.

* * *

Don McGuire, superintendent, with the assistance of Everett Hollingsworth, foreman, is supervising a \$629,046 award to Northwestern Engineering Co. for grading, surfacing and one arch culvert on 10.8 mi. of the Upton-Sundance road in Crook County, Wyo. A 200-day job, work started May 1.

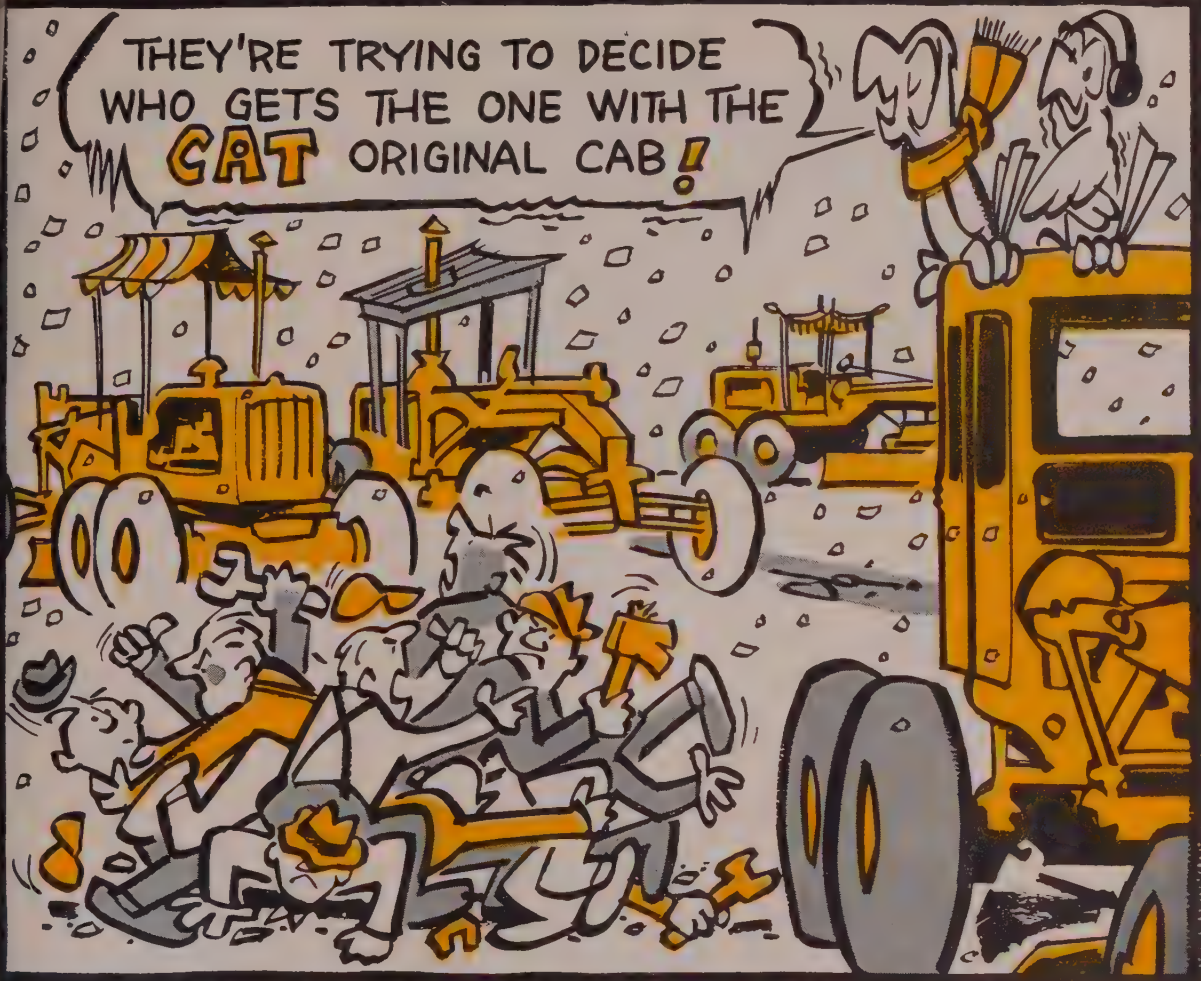
* * *

Paul Taylor, superintendent, T. C. Carr, bridge foreman, and J. D. Arnold, crusher foreman are just finishing up on the \$160,525 job of Armstrong & Armstrong which has been going on since April on a 9.1-mi. stretch of highway grading and surfacing in Curry County, N. Mex.

* * *

M. C. Beach, engineer, and Edward Bernd, foreman, key men for Herron-Strong Co., are working on a grading, surfacing and structures contract under way since May between Fort Lupton and Platteville, Weld County, Colo. This \$379,827 job will probably end this September.

THEY'RE TRYING TO DECIDE
WHO GETS THE ONE WITH THE
CAT ORIGINAL CAB!



Thinking of an attachment for your Caterpillar machine?

Be sure of these points: Is it ruggedly built—as ruggedly built as the big yellow machine it'll work with? Does it attach and detach easily? Is it designed with your operator's safety in mind? Is it *complete*, or will it need special fittings?

CAT* attachments fill the bill every time. They increase operator comfort and convenience—which means increased efficiency. You get *more work* out of your machine.

See your Caterpillar Dealer's Parts Representative for information and catalogs on the complete line of Cat original attachments for your machines.

Caterpillar Tractor Co., San Francisco, Cal.; Peoria, Ill., U.S.A.

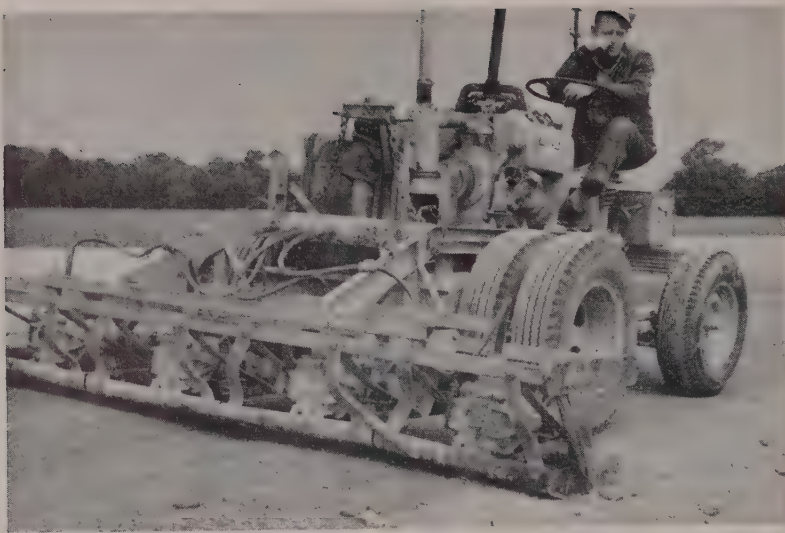


Cat all-weather steel cabs are tailored to fit exactly your Caterpillar-built Tractor and Motor Grader. Simple to install, yet they afford maximum vision while keeping out wind, snow, sleet, rain and dust.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.





JACKSON MULTIPLE COMPACTOR PROVED ON HUNDREDS OF PROJECTS

THE FASTEST, MOST ECONOMICAL AND VERSATILE MACHINE FOR OBTAINING 100% OF REQUIRED DENSITIES IN GRANULAR SOIL BASES, SUB-BASES AND ALL MATERIALS NORMALLY USED IN MACADAM BASES AND PAVEMENT WIDENING PROJECTS . . . LARGE FILLS AND SIMILAR JOBS. EACH OF THE SIX UNITS IN STANDARD WORKHEAD DELIVERS 4200 TWO-TON BLOWS PER MINUTE.

The Jackson Multiple will save you many, many times its cost in time and money. See it at your nearby distributor. His name and literature on request.



The photo above shows the perfect adaptability of the Jackson Multiple Compactor to pavement widening by grouping and towing individual compacting units at the side of tractor for one-pass, complete consolidation on practically every project. At left, see how the end unit on a base compacting job assumes the correct position without adjustment to contain and compact the base edge simultaneously with horizontal base compaction.

Furthermore, individual units may be fitted with operating handles and used exactly like the highly popular, standard Jackson Manually Guided Compactors for getting into the tight places that no other mechanical compactors will reach.



JACKSON VIBRATORS, INC. LUDINGTON MICHIGAN

Ralph "Tuffy" Jones is superintending a \$1,064,978 construction of a portion of highway in Elko County, Nev., a Morrison-Knudsen contract. Other key men on the work, which started April 19, are Bob Boyer, master mechanic, and John P. Cotner, office manager.

* * *

Clifford E. London is general superintendent for San Francisco Bridge Co. which won the \$2,921,750 award for dredging silt and sand for the deepening of existing channel and turning basin, and for extending rock seawall westward to utilize sand for runway extension at the U. S. Naval Air Station, Alameda, Calif. Other key men on this contract are J. Russell Francis, dredge captain; Frank Lampson, dredge chief engineer, and Einar Johnson, levee superintendent. Work started in March and is scheduled for completion in July, 1957.

* * *

Bill Lasseter is supervising construction of a 434 x 100-ft. factory building going up for the Helipol Corporation between Newport Beach and Costa Mesa, Calif. M. J. Brock & Son is contractor on the \$2,500,000 structure. Other important Brock men are E. V. McCauley, office manager, and Bill Gilbert, carpenter foreman. For plumbing contractor Earl O. Stice, Bill Vaughan is superintendent.

* * *

S. E. Craft, project manager, and Lafay Stapp, project engineer, are key men on the \$1,299,500 contract being executed by Fred J. Early, Jr., Co., Inc., covering utilities modernization and extensions for the Navy at North Island, San Diego, Calif. Office manager is Ray Parkinson. Foremen are Eugene Caywood, pipefitter, and Charles M. Nelson and William Sample, carpenter.

* * *

Roger Griffin recently moved to Edwards AFB (Calif.) rocket engine test site as project superintendent for Stolte, Inc., contractor constructing four visiting officers quarters which are a part of the Air Force program for rocket engine and fuel research.

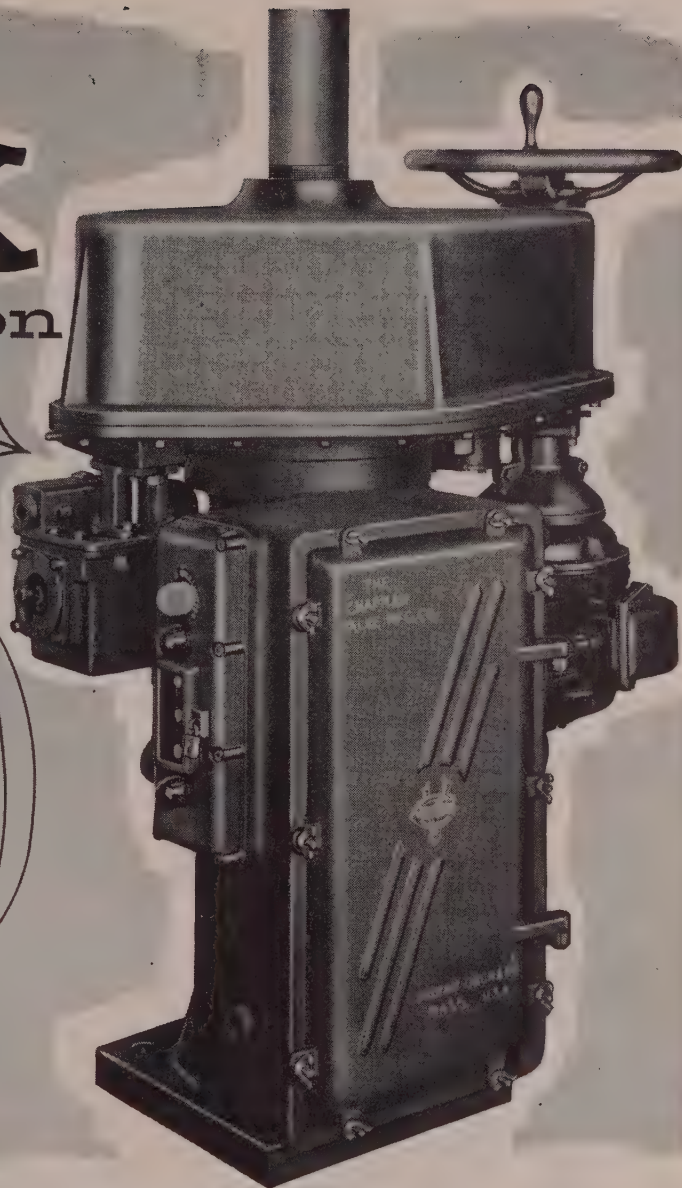
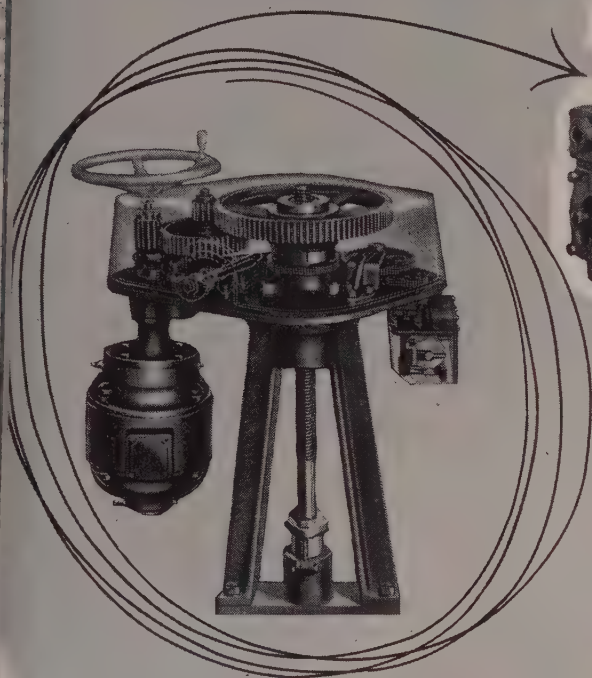
* * *

George Piedmont has been named project manager by Morrison-Knudsen Co., Inc., for construction of Noxon Rapids Dam near Noxon, Mont. Piedmont was recently with Columbia River Constructors at Bridgeport, Wash.

* * *

William H. Proctor is general superintendent on the freeway work being done by Granite Construction Co. at Santa Cruz by-pass, Highway 17 to Highway 1, Calif. This \$1,000,000 contract was started in the summer of 1955, but the job was extended as a result of damage due to the floods last December, necessitating

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We've done one thing for you. Chapman's Motor Units . . . for operation of valves, floorstands and sluice gates . . . are in the best of condition for accurate performance and longer, lower cost life.

We've made them as you like them . . . simplified them . . . streamlined them . . . taken off all the fat. In fact, when you look at a Chapman Motor Unit today, you can only find approximately *half as many parts* as on any other unit.

This simplicity, combined with Chapman's traditional ruggedness, means less trouble and lower maintenance over a longer period of smooth, accurate performance.

How can you go wrong? With Chapman Motor Units, the simplified design . . . the sturdy construc-

tion . . . mean no drift; less slash, accurate micrometer-controlled limit switch for predetermined seat tightness; quiet motor driven operation at all times. All at the lowest overall cost.

No trouble with operating positions. Operation is assured at any angle. Rugged stub-tooth gears need no grease or oil. No trouble with operating conditions. All units are weatherproof . . . *steam tight*. No trouble even with installations. When used with floorstands they are completely wired at the factory . . . ready to connect with your leads. Easy and simple to install.

Get our new catalog . . . Catalog 51 . . . on Chapman motor units today.

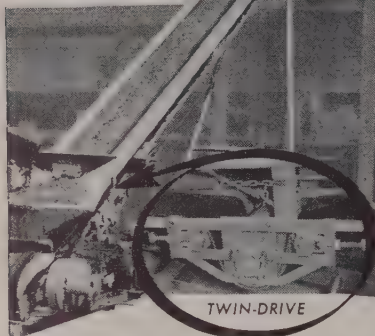
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Albuquerque
THE UNIVERSAL CO., Denver
EDWARD R. BACON CO., San Francisco,
Sacramento, Fresno, Oakland

redesign of the San Lorenzo River bridge. Joe Mathis is office manager. Resident engineer is R. J. Norris. Representing the Bridge Department of the California Division of Highways is J. W. Beck. Working as general foremen on the job are James Gaither, labor; Bill Jensen, carpenter, and John Nour, grading. It is expected the work will be completed in November.



Ed Webb

A. Carlton Gilbert and John R. Dolan of Gilbert & Dolan Enterprises, Inc., are directing the firm's \$375,000 contract for construction of the Safari Hotel in Scottsdale, Ariz. Edward L. Webb is general superintendent of the construction which is basically hollow concrete block with extensive use of flagstone in the commercial building, one of four buildings being erected. Project is now in the completion stage.

* * *

E. L. McColl is superintending a \$625,194 job for Inland Construction Co. which covers grading, surfacing and bridge construction on 3.9 mi. of the Newcastle road in Weston County, Wyo. Assisting on the job as foreman is George Kasper. Work here got under way the first of July and will probably finish in May 1957.

* * *

David Sheehan is superintending a \$518,397 contract for Peter Kiewit Sons' Co. in the city of Denver, Colo. This street improvement work is located at 32nd Avenue and has been under way since the middle of June, with completion date set for late October.

* * *

John Carroll is superintending one of Peter Kiewit Sons' Co.'s contracts in California. This is a \$710,276 award for construction of a bridge across the Trinity River in Humboldt County. Assisting as foremen in the work, which is scheduled for completion in November, are Bill Vogel, labor, and Sherman Ward, curb.

C. R. Jurgensen, superintendent assisted by Tex Raley, grade foreman has been supervising 7.1 mi. of grading and surfacing on the Conchas Tucumcari road in San Miguel County, N. Mex., for O. D. Cowart who got the award at \$167,031.

* * *

William O. Murphy of Murphy Brothers, Inc., is acting as general superintendent of construction on 2.5 mi. of grading, surfacing, and structures in Kittitas County, Wash., project which went to his company at \$545,109. Resident superintendent is Vern Haisch. Work has been under way since June and will probably be finished the summer of 1957.

* * *

James H. Stewart is project engineer, G. Carlson is concrete superintendent, and Joe Armstrong is grade superintendent for K. S. Mitty Construction Co. which is completing a \$128,784 contract for grading, surfacing, and structures on State Highway 69 in Custer County, Colo.

* * *

Cyril McClellan is supervising a \$571,636 contract for first construction work on the Cougar Dam on the South Fork McKenzie River, Lane County, Ore. This award went to Northwood, Inc., which started work in July and expects to have it completed in March next year.

* * *

Guy Haney, superintendent, Carroll Graves and Pete Morris, foremen, are key men working for S. Birch & Sons Construction Co. on a \$366,881 project for 3.9 mi. of grading and gravel surfacing on the Armington-Lewistown highway in Montana. Under way since May, the job will be completed about October.

* * *

William "Bill" Ille is superintending S. Birch & Sons Construction Co.'s award at \$154,268 for 9.9 mi. of plant-mix oiling in Blaine County, Mont. Assisting in the work, which is now about finished, are Larry Heilman, street foreman, and Paul Larson, plant foreman.

* * *

Archie Averill, bridge superintendent for P. S. Lord, Mechanical Contractors, is in charge of construction of a span over the Wilson River, Tillamook and Washington counties, Ore. Construction of this \$99,090 structure got under way in mid-June and is expected to be finished about the middle of January next year.

* * *

Floyd Hardenbrook, job superintendent, Fred Pankratz, heavy equipment superintendent, and Lloyd Cleveland, office manager, comprise the top personnel for B-E-C-K Constructors, joint venture firm executing the \$2,470,665 construction of family quarters, BOQ for women and NCO open mess at Fort Greeley, Alaska. Construction got under way in July and contractor has the finish date set for September 1957.

G. E. Blankinship, general superintendent, **Al Gentry**, job superintendent, and **Paul Reiman**, carpenter foreman, comprise Babbitt Construction Co.'s top personnel on a \$458,018 contract which started in mid-January for construction of an overpass in Caldwell, Idaho. Project involves approximately 30,000 ft. of piling; 4,000 cu. yd. of concrete are required in the structure. Completion date is set for the first of October.

* * *

R. J. Scalzo, partner in the firm of Thos. Scalzo Co., is directing the company's \$352,616 contract for grading, surfacing and structures on 3.6 mi. of highway in King County, Wash., which started in May. Superintending the job is **P. Raghianti**; master mechanic, **R. Curtin**. October will probably see the wind-up of this job.

* * *

George A. Nugent, general superintendent for Big Horn Construction Co., is in charge of the \$628,759 contract for grading, surfacing and culverts on a section of the Torrington-Cheyenne road in Laramie County, Wyo. Superintendent on the job is **Gail Loop**. Office manager is **John Squire**. Field engineer is **R. O. Cozens**. Acting as grading foremen are **Paul Meeks** and **Jim Pantan**. **W. W. Kelsey** is structure foreman, and **Bert Hedglin** is master mechanic. Work started here July 1 and will probably end Nov. 1, 1956.

* * *

John J. Riskas, vice president of H. & J. Construction Co., is acting as general superintendent on construction of a 25-store shopping center and parking area in Tempe, Ariz., a \$2,000,000 award. **E. L. Inman** is company estimator. Assisting on the project, which got under way May 1, and will probably end Oct. 1, is **John Corella**, carpenter foreman.

* * *

S. J. Datillo, superintendent, with **R. P. Michaels** in the assistant superintendent spot, and **L. K. Waldron** as project engineer, is supervising construction contract on the Slaterville Diversion Dam, Layton pump intake channel, Weber Basin Project, Utah, which was awarded to Mountain States Construction Co. on a \$459,567 bid. Work started here July 1 and will probably end about the middle of December.

* * *

Joe Farrell is superintending a \$1,485,158 job recently awarded to Gordon H. Ball for grading, surfacing, and construction of three bridges in Tulare County, Calif. Assistant superintendent is **Merrill Dubach**. **Harold Tucker** is office manager. Under way since May, the project will probably be completed the summer of 1957.

* * *

Charlie Joy, superintendent, with the assistance of **Richard O'Donnal**, concrete foreman, is supervising a

contract which recently went to **W. J. Henson** covering grading and surfacing in Yavapai County, Ariz. Bid was \$576,289. Job started June 1 and Henson expects to finish next June 15.

* * *

Ken DeWitt, superintendent, assisted by **Joe Joy**, concrete foreman, and **Paul Foster**, grade foreman, is supervising a \$454,279 contract in the hands of **Dale F. Payne**. Work consists of 4.9 mi. of grading and surfacing in Navajo County, Ariz. Payne started working May 1 and expects to have the job finished Dec. 1.

* * *

W. C. Eckhardt is superintending a \$168,470 award to **G. E. Marshall** for 2.4 mi. of grading and gravel surfacing in Valley County, Mont. Mechanic is **Eldon Blumer**. Work started June 10 and will be finished probably by the end of October.

* * *

Paul Crass, superintendent for **Henry Thygesen & Co.**, has been in charge of work on the grading, surfacing and structures contract just finishing on U. S. Highway 666, McKinley County, N. Mex. Price was \$275,880.

* * *

Emil Christensen is superintending a \$273,761 job of grading and surfacing in Larimer County, Colo., for **Northwestern Engineering Co.** Work is scheduled for completion Oct. 1.

* * *

L. C. Snell, general superintendent, **C. W. Covington**, job superintendent, and **Paul Hamby**, assistant superintendent, comprise the top supervisors on contract of **Rice Brothers, Inc.**, for grading and surfacing 8.2 mi. in Mono County, Calif. This is a \$204,081 job now about finished.

* * *

John H. Romish is supervising **C. H. Elle Construction Co.**'s \$839,000 award for construction of **Hawthorne Junior High School** in Pocatello, Idaho. Elle expects to have the structure complete about August next year.

* * *

Truman Hart, superintendent, and **Halger B. Raun**, engineer, are top men on **W. F. Maxwell's** recent award for construction of detour, bridge work, grading and surfacing approaches across the **Santa Clara River** near **Saticoy** in **Ventura County, Calif.** Started June 1, this is a \$605,441 project.

* * *

Oliver Braaten, superintendent, recently finished up on a \$360,000 job for construction of the **Greene St. bridge** which the **City of Spokane** awarded to **Henry Hagman**, contractor. Assisting as foremen: **Bob Kirk**, carpenter; **Walter Wilson**, ironworker; **Theron Johnson**, piledriver; and **Roy Widmark**, labor. For the

City, Phil Holgren was resident engineer, and **George Reese**, inspector.

* * *

Jim Jones, project manager, and **Donald Huey**, general superintendent, with **John Cave**, engineer, are key supervisors on the \$3,000,000 job award to **Henry George & Sons** for a high school project at **Spokane, Wash.** Others among the supervisors are **Ken Webster**, steel superintendent; **John P. Young**, panel yard foreman; **Ted Engstrom** and **Al Poage**, carpenter foremen; **John Rupert**, labor foreman.

Warren-Little & Lund, and **James Smyth Plumbing & Heating**, subcontractors, have **Floy Boyd**, foreman, on plumbing, and **F. J. Felts**, on heating.



Mace Cave Huey Poage

Don Mace is inspector for the architect-engineer firm of **Culler, Gale, Martell & Norrie Perkins & Will**, associate architect, is represented by **Lyle E. Marque** and **Kendall M. Wood**, mechanical engineers, **Joseph M. Doyle**, electrical engineer.

* * *

Emil Wikner, superintendent for **Bocek Bros.**, is supervising a \$166,550 award for 1.2 mi. of grading and paving in **Grays Harbor County, Wash.** This 150-day job was started in mid-April and by late June had been shut down about fifty per cent of the time on account of bad weather.

* * *

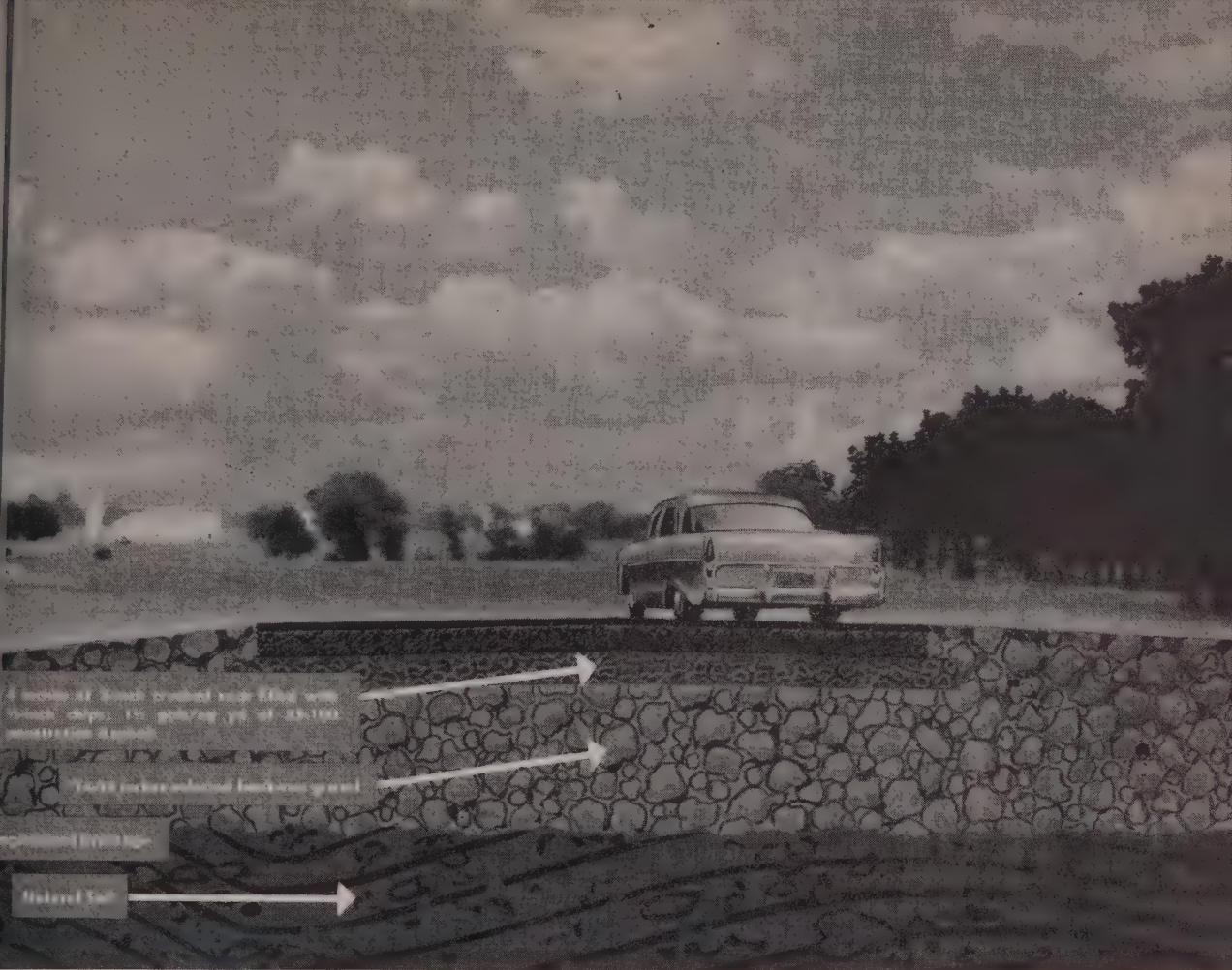
Irvin Logenbaugh acted as superintendent on a 5-mi. grading and surfacing job now in the completion stage in **Catron County, N. Mex.**, for **Logenbaugh & Co., Inc.** Grade foreman on the \$127,000 project was **L. F. "Bud" Frazier**; **Joe Kerns** was labor foreman.

* * *

Neal A. Degerstrom and **H. Tex Brewer**, project manager and general superintendent, respectively, headed up the crew on the 5.1 mi. grading contract awarded on the **Spokane Valley Freeway** in **Washington** to **N. A. Degerstrom Co.** This work was done at a cost of \$432,000.

* * *

William M. "Bill" Frazer is superintending **Peter Kiewit Sons' Co.**'s \$365,421 contract for 7.3 mi. of grading and surfacing in **Fergus County, Mont.** **Crusher** superintendent is **Leonard Rohrer**. Dirt portion is subcontracted to **Walling Construction Co.**



ly \$36.07 to maintain (per mile, per year)

acadam, topped with a double Asphalt surface treatment. Most b-base material came from the right-of-way or adjacent borrow. Bids for the Asphalt structure ran \$85,000 per mile under next vest bids for pavement of comparable specifications. Such a ving pays for many years of maintenance . . . not only of the vement but of the entire right-of-way.

hat about performance?

John O. Morton, New Hampshire Commissioner of Public orks and Highways, has this to say, "The pavement has shown rformance during its first five years of use that leaves nothing e desired."

For low costs, long life, high performance . . . for smooth, safe ling . . . design for Asphalt construction.

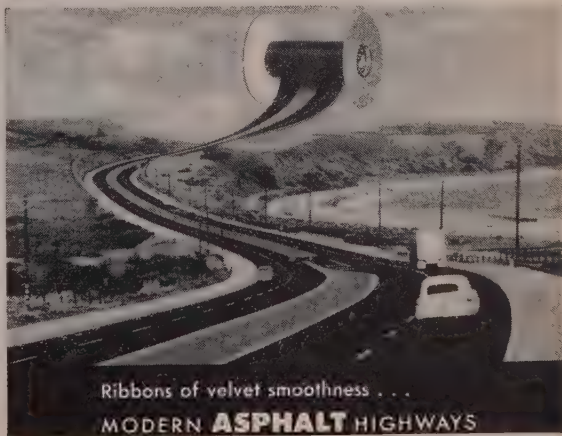
Safety is not a function of cost

Despite its low construction and maintenance costs, New Hampshire's Asphalt Turnpike has achieved one of the best safety records on major highways in the nation.



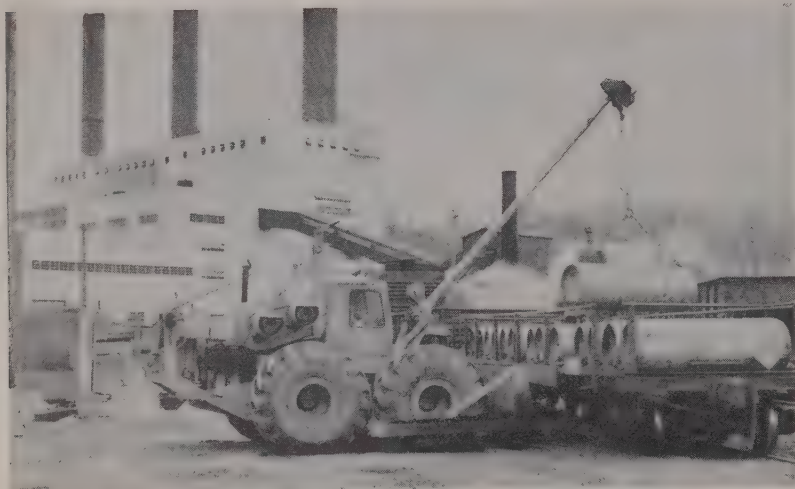
THE ASPHALT INSTITUTE

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Ribbons of velvet smoothness . . .
MODERN **ASPHALT** HIGHWAYS

TRICKS of the TRADES



Boom adds to truck utility

BY ADDING a custom-built boom to a standard rubber tire, coal handling tractor, Indianapolis Power & Light Company has created a unit which does double and triple duty.

Assigned to the company's 271,000-kw. White River Generating Station the tractor not only handles its normal job of dozing and pushloading coal handling scrapers, but also does scattered maintenance and service work around the plant.

The electrically operated boom is built to function without hampering the normal use of the dozer blade. When not in use it folds back out of the way. When extended it provides a crane which will lift a weight of 3 to 4 tons at a reach of 10 to 14 ft. ahead of the tractor. Functioning in this manner it greatly extends the unit's usefulness in handling special assignments.

Additional operations handled by the boom include loading and unloading heavy supplies and materials from trucks and pipe handling involved in repairing and extending the plant's ash disposal line.

The design of the boom was originally conceived by James Lohr, superintendent of the White River Generating Station. With the assistance of members of the Field Engineering Department of LeTourneau-Westinghouse Company, Peoria, Illinois (manufacturers of the rubber tire Tournatractor on which it is

fitted) problems were worked out and the design set down on paper.

The crane is unique in that it is self-erecting and can be extended or folded back by a touch of an electric switch in the tractor cab. An important consideration in its design is that at no point does it interfere with the normal tractor functions either from an operational or maintenance standpoint.

Sewer on blocks

IN PLANNING AN AQUEDUCT that was to carry precast concrete sewer pipes across a small stream English engineers ran into some difficult ground problems. In many places the land they were working on took the form of chalk in almost liquid condition, extending in some spots to 40 ft. below the original ground level.

In order to overcome this, they changed their original bridge design, trebling the span and at the same time substantially increasing deflection, which in the original design had been negligible. In addition to the problem of the initial bridge deflection resulting from the total load of the pipeline, there was the more aggravating problem caused by deflection changes deriving from the variation in loading as the flow in the sewer varied in depth.

Such changes in the bridge deformation would result in disturbing the uniformity of support provided by the three cross-members under each 12-ft. pipe length to a greater extent than could be tolerated by the relatively inflexible pipes.

The solution

The solution hit upon was to support the pipes on four rubber blocks (4 x 4 x 1 in.) at each cross member. The size of these blocks was calculated so that under maximum load conditions the three supporting thrusts on any pipe length would not differ by more than 7% from the mean value and at the same time the deformation of rubber would not be excessive.

A complete and illustrated description of this job appears in the current issue of "Rubber Developments." For a free copy, write Natural Rubber Bureau, 1631 K St. N.W., Washington 6, D.C.



TAMPER ATTACHED TO DROTT SHOVEL USED AROUND STRUCTURES

Gene Richards, Inc., Fresno, Calif., contractor, has found the solution for his tamping troubles in this Ottawa Steel tamper attached to an International Drott TD-6 Skid-Shovel. Used to compact areas near concrete structures where rollers and sheepfoot tools cannot reach, the unit easily meets the 95 per cent compacting requirements. It is shown tamping base on an overpass structure that crosses a large irrigation canal and a highway. One of seven such erections, the site here is part of the Fresno Freeway, which will run north and south through the California city.



Hour after hour, in the heat and dust of Kellogg Hill near Pomona, Calif., heavy-duty earth moving machines are put through their paces as the Winston Bros. Company goes about its job of rebuilding U.S. Highway 99.

As on so many other tough construction jobs, General Petroleum is supplying all fuels and lubricants for the Winston Bros. equipment at Kellogg Hill. Winston's veteran project manager Hugh Thompson says, "G.P. has pioneered and sustained an on-the-job fuel and lube service for which all contractors have a vital need."

G.P.'s Jack Hanafin, a familiar figure at construction jobs all over Southern California, works closely with Thompson, general superintendent Ted Little and master mechanic Lyman Howell in seeing that all Winston equipment is kept in top operating condition.



Jack Hanafin
of General Petroleum



Hugh Thompson,
Project Manager



Ted Little,
General Superintendent

GENERAL PETROLEUM CORPORATION

2-10-53



Unusual welded roof design for gym

STRENGTH AND SIMPLICITY OF DESIGN are embodied in the roof of the Eureka Valley Recreation Center gymnasium at 17th and Collingswood Streets in San Francisco.

Bold use of structural steel to span the 70 x 107-ft. gymnasium emphasizes great strength while lending aesthetic appeal. The unique grid support embodies economic design features of interlacing diagonal steel beams into a monolithic unit. This was made possible by advance skill developed in welding techniques and marks the first time this type of construction has been used in this country. The structure was fabricated and erected by Golden Gate Iron Works,

Inc., of San Francisco from rolled sections furnished by Bethlehem Pacific.

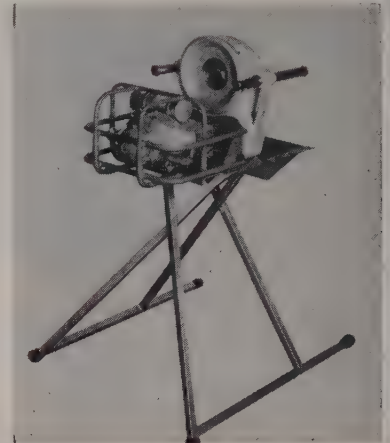
The architectural form of exposed 18-inch steel wide flange beams enclosed by an 18-inch channel section on the perimeter was originated by Appleton and Wolford, AIA, San Francisco architects, in cooperation with their engineer Ira S. Kessey.

The roof design was further enhanced by alternating the direction of laminated wood in the roof deck, emphasizing the diamond pattern formed by the steel grid work. The design was verified by an independent analysis made by Edwin A. Verner, consulting structural engineer.

A HIGH SPEED SAW designed for abrasive wheels has been made available by **Mall Tool Company**, 7725 S. Chicago Ave., Chicago 19, Ill. Built for continuous operation, it is especially suited to hard surface cutting jobs, such as steel, stone, terrazzo, non-ferrous metal, concrete, and compositions. The saw includes a quick depth, bevel adjustments, rip fence guide, automatic telescoping guard, and a lightweight aluminum alloy housing. Further information is available.

A NEW CLAMP CUTTER, Model D-550, specially designed for removing Punch-Lok hose clamps, is being introduced by **Punch-Lok Co.**, 321 North Justine St., Chicago 7, Ill. The 14-in. long cutter is drop forged hi-carbon steel and features a single cutting jaw with slip land to prevent gouging of hose while the other jaw functions as a buttress edge.

AN 80-LB. portable power drive with automatic clutch is now available for cutting, reaming, and threading pipe. Called the No. 142 Featherweight Champ, the unit permits one-man operation; converts regular hand die-stocks, cutters and reamers to power tools; and turns up and takes off fittings. Available with interchangeable gasoline, electric,



TOOLS of the TRADES

Use the addresses listed for further information on any of these items

A LIGHTWEIGHT, electric hammer for maintenance and construction work has been announced by **Ingersoll-Rand**,



11 Broadway, New York, N. Y. Weighing 12 lb., 13 oz., it will drill holes in concrete up to 1 3/8 in. in diameter and deliver up to 1,900 blows per min. Known as the H54U electric power hammer, the tool features a spring-floated piston with sealed spring accelerating the piston to produce a more powerful blow. Full information available.

HEAVY-DUTY adjustable spanner wrenches which eliminate the need for several fixed size wrenches, are announced by the **Owatonna Tool Co.**, 389 Cedar St., Owatonna, Minn. There are two types: No. CT-685 has two interchangeable hooks, one 3/4-in. thick and the other 7/8-in. thick. The heavy-duty CT-686 has a single 3/4-in. thick hook. Both wrenches have eleven adjustments and fit practically all work on tractors, road machinery, power shovels and heavy-duty equipment. Additional information is available.

and air power drives. The gasoline unit is equipped with a Mercury clutch which allows the power source to reach full operating speed before the load is engaged. The machine has an aluminum alloy frame and folding tripod and will handle pipe 3/8- to 2-in. diameter. Mercury Clutch Division, **Automatic Steel Products, Inc.**, 1201 Camden Ave., S.W., Canton 6, Ohio.

PACEMAKERS, a work glove line claimed to incorporate 15 design innovations, is now being produced by **Pioneer Rubber Co.**, Willard, Ohio. Each style is made of neoprene coated flannel in three weights: light, industrial, and heavy with non-slip palms and fingers, and with choice of knit wrist and gauntlet styles. The gloves are recommended where resistance to extreme abrasion and chemicals is important. Plants with hand protection problems are invited to send a job description to the manufacturer's Hand Protection Clinic for analysis and recommendation at no charge.



Electrified for continuous high speed production... the AUSTIN-WESTERN 61-E crushing and screening plant

Here's a single pass, portable crushing and screening plant that operates continuously at *full production speed* to deliver a constant flow of uniform product at low operating cost. It's the Austin-Western 61-E... *electrified* to make it the perfect plant for contractors, counties or townships... on big jobs or small.

Individual electric motors (powered by a diesel driven generator) operate feeder, conveyors and double deck screen through short-coupled V-belt drives. There's no mechanical loss from inefficient gear boxes and open chain drives. The result is maximum operating efficiency for low-cost, high-volume production.

What's more, the 61-E plant is easy to move, simple to operate and maintain because of design and construction extras like these:

- No jacks are required because the heavy welded frame and dual rear wheels give complete stability.

- Push button electric operation eliminates clutches and clutch control levers.
- Electrical hook-up is simplified by using standard motors and control units, and by the elimination of complex wiring systems.
- The single-jaw crusher operates at high speed because it is supported on a heavy forged chrome-vanadium steel shaft mounted in over-sized self-aligning bearings.
- Positive protection against uncrushable material is assured by machined toggle plates in the crusher.

It will pay you to see this plant for yourself at your nearby Austin-Western Distributor. Or, to get detailed information, send for our new 61-E booklet containing complete specifications. Write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

Austin-Western Distributors

Edward R. Bacon Company.....San Francisco, California
Columbia Equipment Company
Portland, Oregon; Seattle, Washington; Spokane, Washington
N. C. Ribble Company.....Albuquerque, New Mexico
C. D. Roeder Equipment Company.....Reno, Nevada
Shriver Machinery Company.....Phoenix, Arizona
Smith Booth Usher Company.....Los Angeles, California
Western Machinery Company.....Salt Lake City 15, Utah
Western Machinery Company.....San Francisco 7, California
Keremi Tractor and Equipment Company
Cheyenne, Wyoming; Casper, Wyoming
Hall-Perry Machinery Company.....Billings, Montana
Butte, Montana; Great Falls, Montana; Missoula, Montana
Engineering Sales Service, Inc.....Boise, Idaho
Macdonald Equipment Company.....Denver 16, Colorado



AUSTIN-WESTERN
CRUSHING, SCREENING AND WASHING EQUIPMENT
BALDWIN-LIMA-HAMILTON
Construction Equipment Division — LIMA WORKS

NEW LITERATURE

Allis-Chalmers catalog

A series of assembly and parts photographs are used in a new 16-page, two-color Allis-Chalmers catalog (MS-1100) to illustrate the engineering and operating highlights of the company's 75-hp. HD-11 diesel powered crawler tractor. The new catalog, now available from the Construction Machinery Division, Allis-Chalmers Manufacturing Co., Milwaukee, Wis., also contains specifications and a two-page spread devoted to the line of equipment matched to the HD-11.

Surveyor's notebook

"Tips from the Surveyor's Notebook," a collection of short articles on unusual surveying problems and their solutions, has been published by W. & L. E. Gurley, Troy, N. Y., manufacturer of engineering and scientific instruments. The 20-page Notebook contains articles, case histories and field tips which have created most comment and have proved most helpful to engineers and surveyors during the six years the Notebook has been published.

IH highway equipment

A 12-page, two-color folder, describing International Harvester's construction equipment in use on highway building across the country, is now available. Illustrated with on-the-job photos, the folder also includes brief specifications of the entire line of International construction equipment. Request Form CR-513-F, International Harvester Co., Construction Division, 180 N. Michigan Ave., Chicago 1, Ill.

Turbine pump literature

Layne & Bowler Pump Co. offers a new bulletin in color showing detail cutaway sections of all components of their Verti-Line, enclosed lineshaft turbine pump, Verti-Line Perihedral impeller seal and dual bowl bearing. Write to 2943 Vail Ave., Los Angeles 22, Calif., for Bulletin 600.

Concrete pipe directory

An up-to-date directory of Western concrete pipe manufacturers and associate members of the industry, has been published by the Western Concrete Pipe Association. The directory contains the address and plant locations of most of the manufacturers in the Western states, as well as a roster of associate members who supply them with the materials, equipment, supplies and services required by the industry. Copies are available from the Western Concrete

Pipe Association, P. O. Box 152, Fresno, Calif.

Construction and maintenance ladders

Extension ladders, single ladders, step ladders and stools for heavy and light duty use are fully described with photos and complete specifications in a new bulletin just released by the Patent Scaffolding Co., Inc., 38-21 12th St., Long Island City 1, N. Y. Ask for Bulletin L-87.

Hydraulic hose selector offered by Republic Rubber

A rubber covered hydraulic hose selector is being offered free to users of hydraulic control hose by the Republic Rubber Division, Lee Rubber & Tire Corp. The revised selector contains latest S.A.E. and industry specifications on hydraulic hose. A selector will be sent to users of hydraulic hose or to any company interested in the product. Write to Wiretex Hose Dept., Republic Division, Youngstown, Ohio.

Littleford 160 tandem roller

A new bulletin covering Littleford's Model 160, 3 to 5-ton portable tandem roller is announced by Littleford Bros., Inc., 502 East Pearl St., Cincinnati 2, Ohio. Bulletin 32 describes such features as hydraulic power steering and trailing conversion.

52-page Oilite manual

An entirely new engineering manual has been released by Amplex Division of Chrysler Corp. Listed as the E-56 Engineering Manual, the 52-page book is thoroughly revised from previous years and contains complete details about Oilite products. Free copies are obtainable from Amplex Division, Chrysler Corp., Detroit 31, Mich.

Spec sheets on grouting

Copies of specifications for the non-shrink grouting of heavy equipment, anchor bolts, building columns, and bridge seats with pre-mixed grout are now available from Master Builders Co., 7016 Euclid Ave., Cleveland 3, Ohio. These specifications in eight sections set forth recommendations on grouting materials, storage of material, mixes in relation to clearance, mixing the grout, forming, preparation, placing the grout and finishing.

Cold applied emulsion for construction industry

A four-page folder describing the characteristics and advantages of Indaco 200, a cold applied emulsion of asphalt and latex is being offered by Indaco Inc., manufacturer of petroleum proofing and waterproofing compounds, with headquarters at 6217 West Slauson Ave., Culver City, Calif.

New Alco products review

Publication of the Spring-Summer, 1956 issue of the Alco Products Review is announced. The new issue of the 28-page product magazine contains articles on heat exchanger design, diesel-electric drilling rig power packages for the oil industry, Alco's new Hi-Qua-Led leaded steel for forged rings and gears, Alcotwin fin-tube heat exchangers, and the new Alco Model 251 diesel engines. Copies available from Alco Products, Inc., P. O. Box 1065, Schenectady, N. Y.

New concrete form catalog

A new 32-page catalog illustrating and describing the Uni-Form Panel System of forming concrete is available by writing the Universal Form Clamp Co., 1238 N. Kostner Ave., Chicago, Ill. Well illustrated, the catalog points out the many features that provide the contractor with a method of forming concrete rapidly and economically.

Symons general catalog

A new 24-page general catalog has been prepared by Symons Clamp & Manufacturing Co. to present its concrete forming equipment. Detailed drawings and specifications are used to describe use of forms on high walls, curved walls, heavy construction, battered walls and jobs using specific types of forms. Copies may be obtained by writing the firm at 4249 Diversey Ave., Chicago 39, Ill.

De Walt power machines

A colorful new 20-page booklet discussing the operations and uses of the company's multi-purpose Power Shop machines has been issued by DeWalt Inc., a subsidiary of American Machine & Foundry Co. The booklet, which contains many on-the-job photographs, can be obtained from DeWalt dealers or by writing directly to the firm at Lancaster, Pa.

Metal lath techniques

"Metal Lath Attached Directly to Wood Supports" is the topic of the latest technical bulletin now available from the Metal Lath Manufacturers Association, Engineers Bldg., Cleveland 14, Ohio. Attention is called to the methods of attaching metal lath directly to horizontal supports. Various tables and specifications are included.

Steel sheet piling

Specifications and uses of lightweight steel sheet piling for protection of light-load excavations are ex-

RPM DELO Oil keeps tractor on the job 15 years



Still Working after 15 years using RPM DELO Oil in this D-8 Caterpillar operated by Edward Keeble Construction Co. Block, crankshaft, and most other parts of original engine are still in use. Another of firm's D-8's using RPM DELO Oil ran 12,000 hours without engine repairs. When torn down, maximum crankshaft wear was .004".



Crawler Crane, like firm's other heavy-duty equipment, uses RPM DELO Oil. Keeble operates 120 pieces of construction equipment—has as many as 30 jobs going at once.



GMC V-8 10-Yard Dump Truck (left), one of a new fleet of 12, also uses RPM DELO Oil. Mr. Keeble (right), says, "For the past 15 years we have kept our heavy-duty engines in top operating condition with RPM DELO Oil. In several instances engines have actually outlasted equipment."



Why RPM DELO Oils reduce wear—prolong engine life

- Oil stays on engine parts — hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrosion of bearing metals
- Inhibitor resists crankcase foaming



For More Information or field help with any fuel or lubrication problem, contact representative of any company listed, or write direct.



TRADEMARK "RPM DELO" AND
 DESIGN REG. U. S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA,
 225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY,
 P. O. Box 780 • Denver 1, Colorado

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*To Help Your Pumps
Give Top Performance
Every Working Hour!*



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SUCTION AND DISCHARGE HOSE

A GOODALL "Standard of Quality" PRODUCT

Put "NEWTYPE" on your pumps and watch them keep on giving their **best** . . . day-after-day. Why? Because this **quality** hose will not kink, buckle or collapse, and has the great strength and durability to stand up **longer** under severest wear and abuse. Made in sizes 1 1/4" to 4", inclusive, in maximum lengths of 50 feet. Readily identified by a green spiral stripe on the black cover, plus the familiar "Cloverleaf" label.

"If it's GOODALL . . . it MUST be Good!"

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Standard of Quality—Since 1870



HOSE • BELTING • FOOTWEAR • CLOTHING
AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL Rubber Company

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.
Branches and Distributors Throughout the United States and in Canada

plained in a new four-page bulletin now available from L. B. Foster Co., 3460 Wilshire Blvd., Los Angeles 5, Calif. The two-color, illustrated bulletin shows how piling can be used repeatedly for such projects as cut-off walls, cofferdams and building excavations.

Sludge removal mechanism

A 12-page, two-color brochure describes the design, types and sizes, operation and features of the Dorcco Monorake, produced by **Dorr-Oliver Inc.**, Barry Place, Stamford, Conn. Sketches, line drawings and installation photographs of this unit, which cleans rectangular settling tanks in water, sewage and industrial waste treatment plants, are also included.

Rolling scaffold introduced

A new catalog insert describing the Fold-Away Rolling scaffold is announced by **Superior Scaffold Co.**, 5624 Bankfield Ave., Culver City, Calif. Catalog sheet 123 contains photos of the basic parts of the new scaffold, a variety of typical set-ups, as well as prices for individual parts and complete scaffolds.

Alco 251 diesel series

Alco Products, Inc., has announced publication of a 14-page bulletin describing the 251 series of diesel engines available in ratings from 550 to 2400 hp. Fully illustrated with photos of individual engine components and production line views, it also includes dimension charts and specification tables for the three engines. Bulletin available from regional sales representatives or from company, P. O. Box 1065, Schenectady, N. Y.

6 to 24-in. sheaves

Sauerman Bros.' new bulletin No. 165 shows specifications for their Duro-lite sheaves carried in stock. A table gives detailed dimensions of sizes from 6 to 24 in. These sheaves are a basic part of Sauerman Duro-lite wire rope blocks and are now available as replacements in other blocks. **Sauerman Bros., Inc.**, Dept. W-6, 620 S. 28th Ave., Bellwood, Ill.

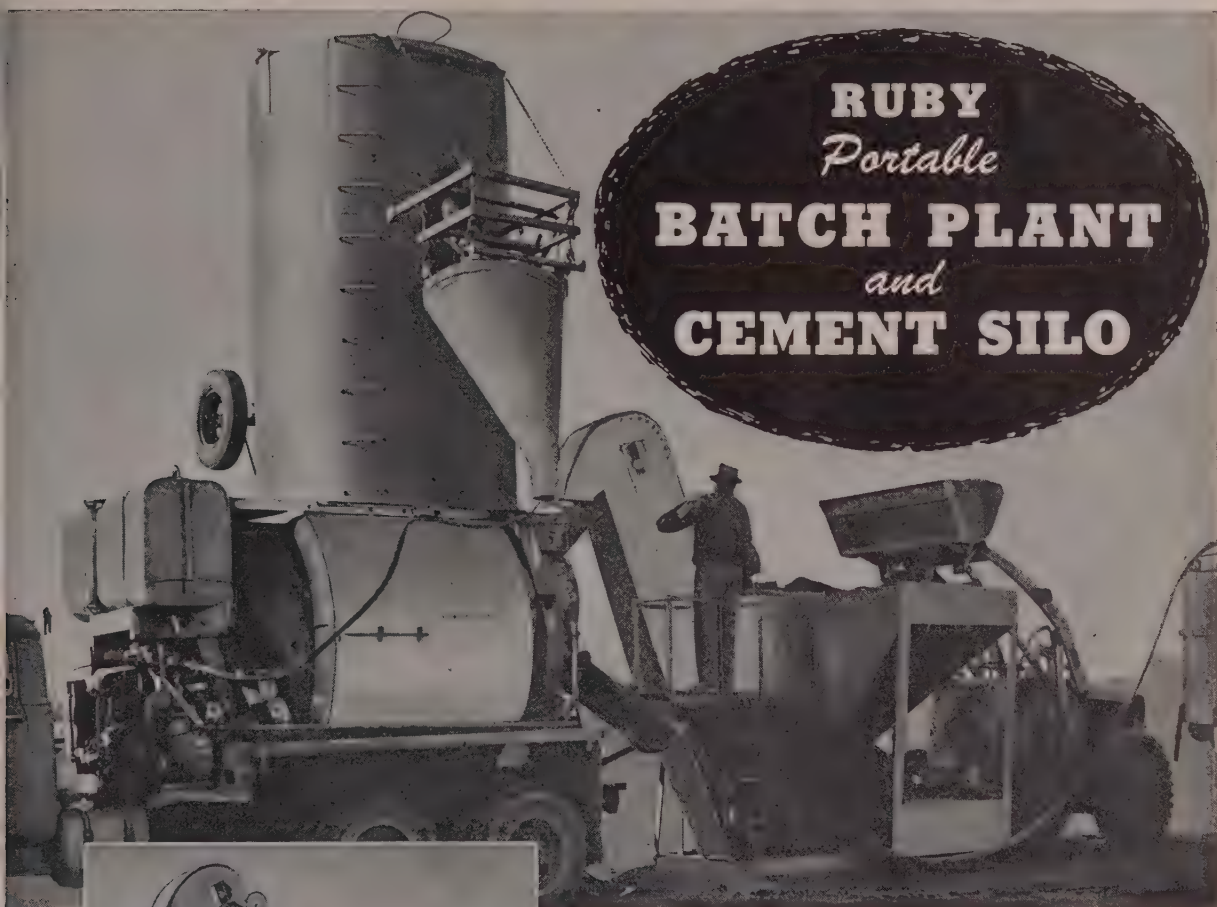
Service tools from Owatonna

A new service bulletin covering International-Industrial tractor pulling and maintenance tools is now available from **Owatonna Tool Co.**, Owatonna, Minn. The bulletin shows a complete set of service and illustrates maintenance procedures. Bulletin HC-56 may be obtained from OTC jobbers or by writing Owatonna Tool Co., 389 Cedar St., Owatonna, Minn.

Towmotor manual

Basic specifications and construction features of Towmotor Lift trucks and accessories are described in a manual published by **Towmotor Corp.**, 1226 E. 152nd St., Cleveland 10, Ohio. Operating instructions and maintenance procedures are included.

The Ruby "Team" that saves batching Dollars!



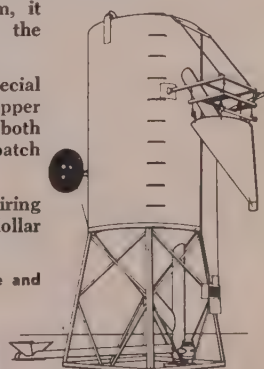
When you find complete portability of both Batch Plant and Silo . . . "one-man" economy of operation . . . and quick, efficient production, all combined in one LOW COST team, it's NEWS! . . . REAL NEWS for the transit mix operator, AND his pocketbook!

The Ruby Portable Batch Plant, in either 3 or 5 yard capacity, is designed for completely portable highway transport and quick, easy installation. Used with the Ruby Portable Cement Silo (170 barrel capacity), as a one-man operated . . . one location . . . batch-on-the-job team, it means lower operation costs from the first day!

The Ruby Portable Cement Silo, also designed for easy highway transport without special permits, is engineered for "team" operation with the Ruby Batch Plant. The Silo scale hopper accurately measures the bulk cement needed for controlled batching. One man operates both units from the Batch Plant platform. Lost time and added labor costs of separate silo and batch plant locations are eliminated.

The Ruby Portable Cement Silo makes bulk cement use a "profit-maker" on jobs requiring even small amounts of transit mix concrete. Complete portability of both units means dollar savings on every yard of concrete handled.

Write to Clark's Welding Works, Dept. 5, Perkins, California, for complete information or the name and address of the dealer nearest you.



Sketch of Ruby Cement Silo showing loading hopper

CLARK'S WELDING WORKS

PERKINS, CALIFORNIA (SUBURB OF SACRAMENTO)

IT PAYS TO "GO INTO THE HOLE"

WITH
AN

OWEN
BUCKET

and Come Up With

"A Mouthful At Every Bite"

Here's an everyday "Going in the Hole" Operation where money is MADE not LOST.

Experienced excavating contractors and crane operators alike know that "Going in the Hole" with an OWEN BUCKET is profitable.

For better bucket maneuverability, maximum penetration, quick, full loading and rapid, complete discharge — you can't beat an OWEN BUCKET.

Special teeth simplify trenching operations and greatly shorten excavation time on every job.

Write for the Catalog...

THE OWEN BUCKET CO.

6060 BREAKWATER AVENUE

CLEVELAND, OHIO

Branches: New York, Philadelphia, Chicago, Berkeley, Calif., Fort Lauderdale, Fla.

Owen Buckets are designed to transform weight into penetrating power.

Photo courtesy of
Bay City Shovels, Inc.



Diesel power for construction equipment

A handy reference booklet listing over 1000 models of construction and industrial equipment now available with Detroit diesel engines as standard or optional power has been released by GM's Detroit Diesel Engine Division. The models listed range from small pumps to giant excavators and earthmoving vehicles. Over 150 manufacturers are represented. The booklet can be obtained from Detroit diesel distributors and dealers by writing **Detroit Diesel Engine Division, General Motors Corp., Detroit 28, Mich.**

Lubrication data

A newly revised issue of Lubriplate Data Book No. 56-1 is now available from the Lubriplate Division of **Fiske Bros. Refining Co., 129 Lockwood St., Newark 5, N. J.** The booklet gives detailed information on the lubrication needs of all types of machinery and a complete directory of Lubriplate distributors throughout the country.

Crushing and screening plant arrangements

A new portable Plant Handbook is announced by **Nordberg Manufacturing Co., Milwaukee 1, Wis.** The handsomely bound brochure presents ideas for the design and construction of portable and semi-portable rock crushing and screening plants employing Symons cone crushers and vibrating screens. Bulletin 238A contains engineering drawings for nine different types of crushing and screening plants. A specification sheet accompanying each drawing lists the equipment to achieve various plant capacities.

Centrifugal pumps from Ingersoll-Rand

A new bulletin covering the complete line of class CRV cradle-mounted centrifugal pumps has been announced by **Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.** A concise tabulation of pump types with their rating is included as well as performance tables and dimensions for the entire line. Request Form 7223-B.

U. S. motors bulletin

A newly revised bulletin which includes a more complete line of U. S. motors is being released by **U. S. Electrical Motors, Inc., Box 2058, Los Angeles 54, Calif.** Descriptions and full-color illustrations are included of open-type Uniclosed designs, totally enclosed and explosion-proof types, Varidrive, Syncrogears, and right-angle worm gear models; also vertical motors and Verticlosed hollowshaft types. Ask for Bulletin 1878.



RUGGED WAGNER EQUIPMENT

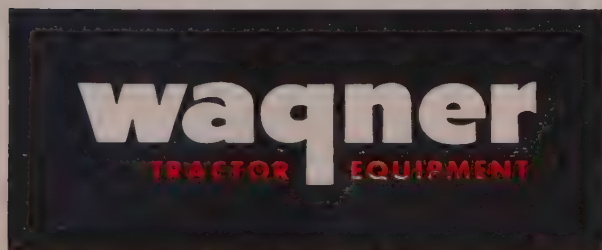
**makes a tractor your most versatile
and inexpensive construction tool**

Now a tractor can be the most important single tool on your construction jobs. When it's teamed up with rugged Wagner tractor equipment, nothing else can do so many jobs so well.

By equipping a tractor with a Wagner Backhoe you make short work of digging footings, sewer, gas and power trenches and septic tanks. Likewise a tractor and a Wagner loader do a faster,

better job of land clearing, excavating, back-filling and landscaping. And all the while you'll be speeding construction, saving man-hours and increasing profits.

Check with your nearby Wagner dealer to see how Wagner tractor equipment can cut time and labor costs on your construction jobs.



WAGNER IRON WORKS, 1905 South 1st St., Dept. 125
Milwaukee 1, Wis.

Send me more information on Wagner Tractor Equipment
for a tractor.
(make)

NAME

COMPANY

ADDRESS

CITY STATE

"WAGNER BUILT" MEANS "BETTER BUILT" FOR OVER 105 YEARS

Sherman Major power digger

An 8-page, fully illustrated booklet now available highlights the digging performance of the Model 54E Sherman Major power digger, a heavy duty backhoe unit engineered especially for attachment to the Fordson Major tractor. The booklet, Form No. SP-554, is available on request to **Sherman Products, Inc.**, Royal Oaks, Mich. It describes and illustrates purpose and construction of such features as hydraulic stabilizers, actuated bucket linkage, and steel cable linkage for control of swing action, and includes specifications table.

Italian-make hydraulic shovel

The Yumbo hydraulic shovel, developed in Italy seven years ago, is now being manufactured by **Geco, Inc.**, P. O. Box 117, Denver, Colo. A 4-page illustrated bulletin is now available describing the features of this shovel which include a ball bearing turntable and self-braking mechanism.

Monorail transport

A new method of transporting material by means of a self-propelled monorail unit is described and illustrated in an 8-page color brochure issued by **Chain Belt Co.**, Milwaukee

1, Wis. The power unit has a running speed of 300 ft. per min. in either direction, power is supplied by a 6-hp. gasoline engine. Bulletin 56 47 is illustrated with job photograph and a specification sheet is included.

Pile hammer delivers 60 blows a min.

The new S-20 single-acting pile hammer designed for driving the heaviest piles and delivering 60 blows a min. with a force of 60,000 ft. lb. is described in a bulletin just released by the **McKiernan-Terry Corp.** The bulletin explains features of this pile hammer that save operating time and maintenance costs, and includes operating data, dimensions, sectional elevations, and parts list. Copies of Bulletin 59A available from **McKiernan-Terry Corp.**, 100 Richards Ave., Dover, N. J.

Cleveland bulletin lists complete line

The complete line of Cleveland trenchers and backfillers, including the recently introduced Cleveland L-270 ladder-type trencher, is featured in a new 4-page bulletin published by **Cleveland Trencher Co.**, 20100 St. Clair Ave., Cleveland, Ohio. Information of the capacities, specifications and dimensions of the nine machines has been organized to facilitate a convenient comparison of the models.

Cat DW20 tractor

Concise performance and cost data on the Caterpillar DW20 tractor and matched equipment are contained in a new 16-page booklet published by **Caterpillar Tractor Co.**, Peoria, Ill. The reader is provided with a simple, accurate guide in figuring owning and operating costs with blank spaces for adjusting to specific local conditions. Entitled "Caterpillar DW20 Tractor and Equipment" (Form No. DE6150), this booklet is obtainable from Caterpillar dealers or by writing the company.

Model HD-6G tractor shovel

Structural features of the Allis-Chalmers HD-6G diesel powered tractor shovel are discussed, and the shovel hydraulic system of this tractor shovel reviewed, in the new two-color, 8-page catalog (MS-1101) now available from the Construction Machinery Division, **Allis-Chalmers Manufacturing Co.**, Milwaukee, Wis.

Automatic drive for fork lift trucks

Full data on TowmoTorque Drive, an automatic transmission system on fork lift trucks, is contained in a folder published by **Towmotor Corp.**, 1226 E. 152nd St., Cleveland 10, Ohio. Construction characteristics, and hydraulic and control systems are explained in detail.



Construction crew assembles 530-foot-long Armco Bin Wall in repairing slide damage on an Illinois highway.

Highway Break is Quickly Repaired WITH ARMCO WALLS

Just three weeks after a severe slide carried away a 1700-foot section of an Illinois highway, it was restored to full use. A 530-foot installation of Armco Bin-Type Retaining Walls played an important part in quickly getting the highway back into service.

Armco Retaining Walls Help Contractors

Every contractor likes to speed work and hold down costs. All-metal Armco Walls help him do this because there is no troublesome formwork and excavating is reduced to a minimum. Bolted assembly means that small crews can do the work easily and quickly—without special training or equipment. Earth fill, added to assembled bins, provides the necessary weight and stability.

Armco Retaining Walls—with an 18-year service record—are especially recommended to stabilize steep cut or embankment slopes, for road widening and grade separation projects, for wingwalls and for limited right-of-ways. Write us for data on sizes, prices and delivery.

ARMCO DRAINAGE & METAL PRODUCTS, INC.

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ARMCO RETAINING WALLS





Now from INTERNATIONAL...

New "all-purpose" light-duty 4-wheel-drive truck!

Here's the four-wheel-drive truck you've been waiting for! Here's a full-size, all-purpose truck you can use to go anywhere.

On or off the road, this new INTERNATIONAL S-120 (4x4) will take the toughest grades in stride—fully loaded, it will move entire 7,000 lbs. of truck, body and cargo through soft sand, mud or snow. It's made to match all light-duty 4x4 jobs *exactly* with choice of 2 engines, 3 pickup, 2 stake and platform bodies, and the 8-passenger, triple-duty Travelall.® Exclusive INTERNATIONAL full-torque power take-off transfer case available, plus power take-off transmissions for auxiliary equipment operation. Available in 6 tire sizes, including 7.00 x 18 for extra clearance and 9.00 x 16 for extra flotation and traction.

This new INTERNATIONAL is all truck-built for rough, tough four-wheel-drive service . . . built to save you the BIG money, the operation and maintenance money. Before you buy any light-duty four-wheel-drive truck, see and drive this one at your INTERNATIONAL Dealer or Branch!

INTERNATIONAL HARVESTER COMPANY • CHICAGO

INTERNATIONAL® TRUCKS



**All-Truck Built
to save you
the BIG money!**

Motor Trucks • Crawler Tractors • Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors

**A Complete Line
of All-Wheel-Drive Trucks
for Every Tough Job Need**



S-140 (4x4), 11,000 lbs. GVW. Has 4-speed transmission and 2-speed transfer case, for 8 forward and 2 reverse speeds.



Bigger models, too. S-160 (4x4) Series, 15,000-18,000 lbs. GVW. SF-170 (6x6) Series, to 26,000 lbs. GVW. All have exclusive INTERNATIONAL full-size Comfo-Vision cabs . . . feature easiest steering and handling.



... you'd have to be rugged. Masters are.

Few pieces of equipment have to take this kind of a beating. 9,500 to 12,000 vibrations per minute against abrasive bits of stone, in wet cement. Imagine yourself inside one. Rough!

That's why it pays to buy *only the best* in vibrators... and why the *service* you get is just as important as the vibrator itself.

No flexible shaft vibrator is made with more care or better materials, than the Master... and our nearest distributor is ready with the service you want. He handles a complete line of gasoline and electric powered vibrators for any vibrating job. Try him. See for yourself.

For full information, specifications and prices on any Master product, see your Master distributor. There's no obligation... he's glad to help you.



Portable Gasoline



Lightweight Electric

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POWER EQUIPMENT COMPANY.....	Denver, Colorado
SHRIVER MACHINERY COMPANY.....	Phoenix, Arizona
SIERRA MACHINERY COMPANY.....	Reno, Nevada
WORTHAM MACHINERY COMPANY.....	Casper, Cheyenne, Newcastle
	Riverton, Rock Springs, and Sheridan, Wyoming

**Brochure describes
Allis-Chalmers scraper**

A 16-page, two-color catalog describing the Allis-Chalmers TS-260 motor scraper is now available from the Construction Machinery Division, Tractor Group, Milwaukee, Wis. Specifications and parts photographs accompany text.

**Two bulletins from
Twin Disc Clutch Co.**

Two new bulletins are now available from Twin Disc Clutch Co., Hydraulic Division, Rockford, Ill., manufacturers of torque converters. Bulletin No. 507 describes the Series 13,800 Twin Disc three-stage torque converter; Bulletin 508 presents the new Series 1500 single-stage torque converter. Both brochures contain detailed information on the construction and application of the new series.

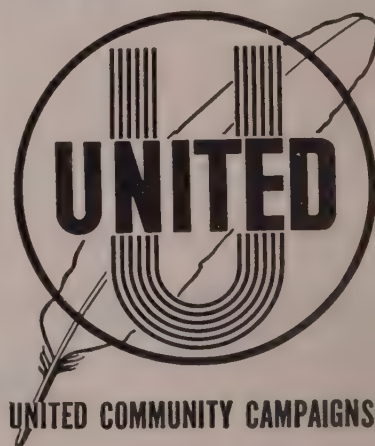
**Warning signal for
accident prevention**

Information on the Gyalite flashing visual warning signal for accident-prevention purposes is available in a bulletin prepared by the Pyle National Co., 1336 North Kostner Ave., Chicago 51, Ill. The new model, No. 15360, is mounted in a heavy cast aluminum housing and flashes 96 times a minute in red, clear, or other colored light.

MECO catalog revised

Modern Engineering Co., manufacturer of oxy-acetylene welding and cutting equipment, has announced the 1956 revision of its No. 150 General Welding Catalog covering its complete line of oxy-acetylene welding and cutting torches, machine cutting torches, regulators, pressure gages, hose connections, couplings, and safety equipment. Copies of the catalog and price lists obtainable from the company, Dept. 361, 3407 Pine Blvd., St. Louis 3, Mo.

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Forged Alloy
Steel Available
For Most Adapters

There is no substitute
for forged alloy steel

Rolled Alloy
Steel Hammer
Forged Points

*Teeth that
really dig*

H&L

TOOTH CO.

1540 SOUTH GREENWOOD AVE.
MONTEBELLO, CALIFORNIA

25th *Silver Anniversary*

NEW EQUIPMENT

For your convenience in obtaining more information quickly, the manufacturer's address is provided with each review.

Koehring 3-yd. excavator

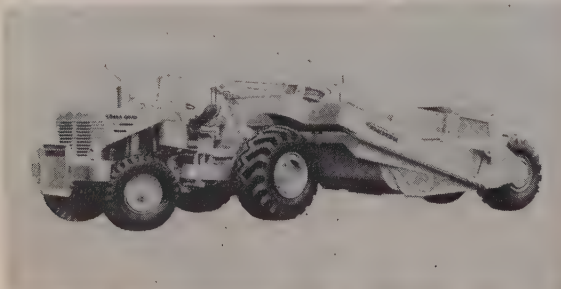
Koehring Co. has begun production of its Model 1205 excavator. Listed in the 3-cu. yd. dipper capacity class, it has a lifting capacity of 95 tons at 75% rating. The standard shovel attachment combines a 30-ft. boom with 22-ft. dipper sticks and 3-cu. yd. shovel dipper. For the crane the basic 60-ft. alloy steel boom can be extended to a maximum 180-ft. length, plus an additional 30 ft. of jib



boom. The all-welded turntable and car body include mechanical swing and main clutches that do not over-heat even under extreme working conditions. Power actuated clutches on the main drums are applied by hand lever control and traction brakes are spring loaded and released by air. The Model 12-5 is fully convertible from shovel to lift-crane and dragline or clamshell operation. Koehring Co., Milwaukee 16, Wis.

26-yd. heavy-duty scraper

A three-axle type, self-propelled scraper with heaped capacity of 26 cu. yd. is being produced by Wooldridge Manufacturing Division, Continental Copper & Steel



Industries, Inc., of Sunnyvale, Calif. Comprised of a 300-hp. diesel four-wheel tractor with a two-wheel scraper attached through a heavy universal ball and socket yoke connection, the scraper is rated at 26 cu. yd. heaped and 20 cu. yd. struck with load carrying capacity of 56,000 lb. A fluid coupling drive is provided for smoother operation, easier shifting, and minimum strain on the power train. Other features include air actuation of clutch, transmission and winch; hydraulic steering; and a helical gear synchro-mesh transmission which provides nine speeds forward and two in reverse, with haul speeds over 32 mph.

Drop frame design for heavy-duty trucks

In order to shorten and lighten the chassis for greater payload and more loading space, Kenworth Motor Truck Co. is installing a new drop-frame design in all its conventional models. When built with an aluminum frame, Kenworth's drop-frame conventional saves 410 lb.; and in steel construction, it saves 270 lb. The rig measures 86¾ in. from the back of cab to center line of front axle, without reduction in driver leg room. Design improvements include eliminating lubrication of spring mount-



ings, shortening the drive brackets and lightening the weight of the radiator by casting the radiator connections integrally with the top and bottom tanks. Full details available from the manufacturer, 800 East Marginal Way, Seattle, Wash.

Self-contained internal combustion pile hammer

A new internal combustion pile hammer is being produced by McKiernan-Terry Corp., Dover N. J. The diesel powered hammer is completely self-contained and requires neither boilers nor air compressors. It has built-in fuel and lubricant tanks. A 3,000-lb. ram delivers 45 to 55 strokes per min. with an average force blow of 18,000



ft.-lb. The hammer works most efficiently with 1 or 2-ton piles at a bearing of from 40 to 90 tons and is worked by a single load line from a 30 to 35-ton crawler or truck crane. For further information, about the McKiernan-Terry DE 30, write the manufacturer.

Here's why



ROCK RIPPERS

lick jobs others can't touch!

TOUGHEST, BEST-DESIGNED SHANKS!

Contoured for extra strength at strain points; made of manganese-moly steel, heat treated four times.

DRAWBAR MOUNTING SAVES YOUR TRACTOR!

Rugged ATECO drawbar takes the pull, protects you against costly transmission case damage.

HEAVIEST-DUTY CONSTRUCTION ON THE MARKET!

Tool beam, for example, is box-girder welded of 1 1/2" steel plate with sides in compression. Solid steel—not the weld—takes the strain.



OUTPERFORMS

'EM ALL! Replaceable rock points have splitting wedges; underground "quiver" of curved shanks works like a jackhammer to shatter rock and shale fast, with less power. Rock is rolled up and out in the clear, back of tool beam.

Make your "cat" a 3-way profit maker with an ATECO ripper plus your dozer—ready to rip, bulldoze or push-load instantly without tool changing! No other ripper on the market matches ATECO's reliability and performance—why settle for less? Promptly available for Caterpillar D9, D8, D7 and D6 tractors—see your Caterpillar dealer or write today for literature.

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Clear — Pigmented — Black

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Wax Base — Non-Wax Base

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(YOUTZ-SLICK METHOD)

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Hand and Power Operated

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Ready Mixed Rubber Base Mastic,
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AIR METERS FOR CONCRETE ENGINEERING

- Comply with all leading specifications
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INCORPORATED

COMPANY

600 Lairport Street, El Segundo, California

New buckets for Cat Traxxcavators

A new line of buckets, designed for quarry and mining operations, rock handling, pavement removal and other tough jobs, is being offered as attachments for No. 977, No. 955 and No. 933 Traxxcavators by Caterpillar Tractor Co., Peoria, Ill. Among the new buckets are heavy-duty, quarry and skeleton rock models. The quarry buckets are available for all three models of Traxxcavators and range



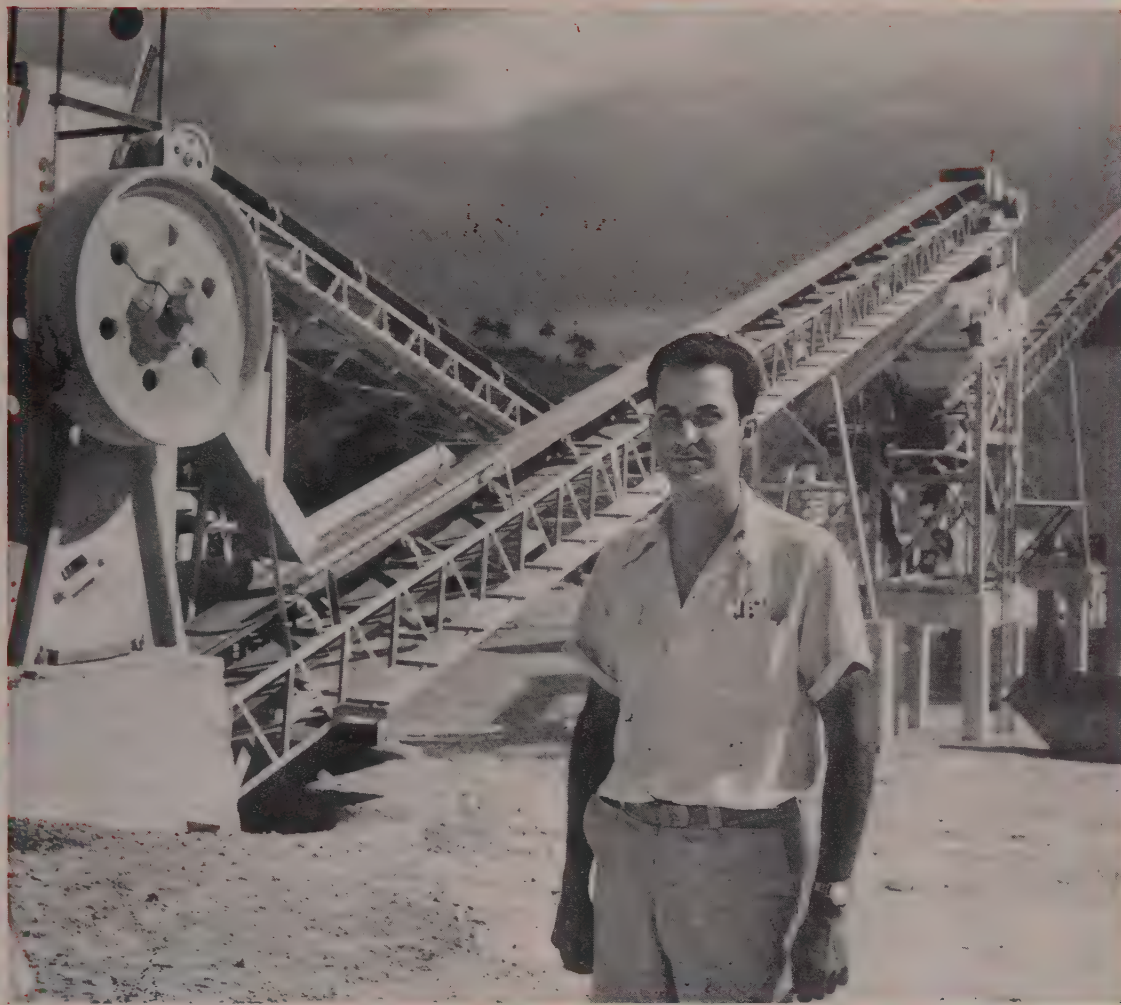
in capacity from 1 cu. yd. for the No. 933 Traxxcavator, to 2¼ cu. yd. for use with the No. 977. Capacity of the No. 955 skeleton rock bucket is 1½ cu. yd., while the model used with the No. 977 Traxxcavator is rated at 2¼ cu. yd. Both type buckets have welded-on tooth adapters and removable tooth tips. The heavy-duty bucket to be used for digging in dense material with the No. 977 Traxxcavator is 77½ in. wide and has a 1¾ cu. yd. capacity.

New model Hydra-Hammer

Hydraulically controlled tower tilt and lay-down, improved engine cover which can be locked against theft, adjustable seat and brake pedal, hydraulic transmission and shock accumulator, rear fenders and a streamlined appearance are among the features of the newest model Ottawa Hydra-Hammer. Operable by one man, this machine is used to cut asphalt and break concrete pavement for trenching or demolition work; tamp backfill in

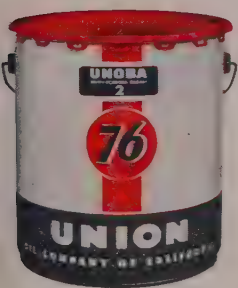


trenches or patching operations; tamp rock or heavy aggregate to stabilize sub-grade; compact blacktop patches; and drive highway guard rail posts or short piling. The tower traverse arrangement on the hammer enables fast horizontal movement right or left of the tower, while still maintaining a vertical position. Illustrated literature available from Ottawa Steel Division L. A. Young Spring & Wire Corp., Ottawa, Kan.



H. Amengual, engineer, Jamaica Rock Crushers, Inc., Cuba

“UNOBA...finest grease obtainable”



“Union Oil products protect our crusher against dust and climatic conditions which can be unbelievably bad here in Cuba.

“Sometimes our plant is deluged by tropical downpours...other times the dust gets so thick it looks like we’d had a snow storm. However, since we went into production over a year ago we’ve lubricated all bearings with UNOBA, and even during this rough ‘shakedown’ period we haven’t lost

a single one in the Rogers Iron Works crushers, conveyor rolls, shaker screens or anything else. In my opinion UNOBA is the finest grease obtainable for tropical operations like ours.”

In spite of drenching rains and high temperatures UNOBA *stays in bearings to keep dust out...* it’s truly a *multipurpose* grease. Immediately available from your nearby Union Oil representative.

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Low-bed trailer increases payload

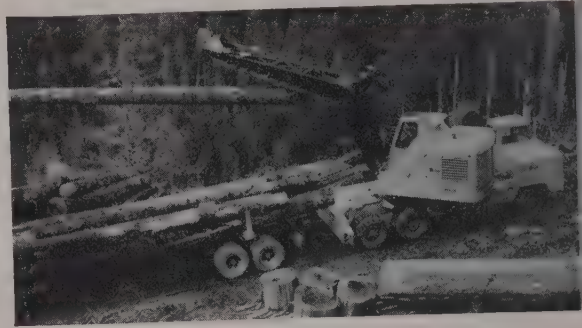
Talbert Trailers, Inc., and Hendrickson Manufacturing Co. announce manufacture of a new low-bed trailer, model TL-25-RG-spl. The unit is the first of its kind and the first low-bed trailer suitable for a 9-ft. spread tandem assembly which makes possible an increased



payload. The tandem assembly incorporates the Hendrickson RSO-365-9 tandem suspension unit. Removable outriggers may be provided for transporting 10-ft. wide loads. A removable gooseneck is provided for fast, safe front end loading. For complete data, write Talbert Trailers, Inc., 7950 West 47th St., Lyons, Ill.

Improvements on Michigan excavator crane

An increased rating to 25 tons and a new chassis incorporating the Clark Power Train are features of the Michigan T-24 excavator-crane introduced by Construction Machinery Division, Clark Equipment Co., Benton Harbor, Mich. It has a gross vehicle weight of 51,000 lb. equipped as a crane, which can be reduced to 41,500 lb. for highway travel by removing rear outriggers, crane boom and counterweights. For steel erection, the T-24's maximum boom length is now 100 ft., increased from 80



ft., with jib booms 15 to 30 ft. in length. The Power Train consists of a five-speed transmission, a two-speed transfer case and planetary wheel driving axles, all Clark designed and built. The unit has a 160-bhp. gasoline chassis engine and a maximum travel speed of 39 mph

Allis-Chalmers introduces new scraper

Allis-Chalmers is introducing its new TS-260 motor scraper, a 200-hp. unit weighing approximately 36,600 lb. Powered by a 6-cylinder Allis-Chalmers diesel engine, it has a 14-cu. yd. capacity. A hydraulic pump, gear driven from the rear of the engine crankshaft, provides power for steering and scraper operation. The scraper has a curved bottom and three-piece cutting edge with offset center edge to assure fast penetration. Positive forward ejection plus high apron lift provides fast clean spread



ing. Other engineering features include selective hydraulic steering which provides two-speed steering by action of a steering control valve that is actuated from the wheel by direct linkage. Synchronized 4-wheel brakes are supplemented by an emergency brake system which goes into action in event of air line failure. Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

C&D Movalls now available for all tractors

Now available for all rubber-tired tractors, are C&D Movall Rock-Wagons, produced by Yube Manufacturing Co., Benicia, Calif. The expanded line makes it possible for earthmovers to put Movalls behind any of the following prime movers: Allis-Chalmers TS300 and TS360; Caterpillar DW10, DW15, DW20, DW21; Euclid TD FDT, LDT; International 75 and 55; LeTourneau Super C; all models of M-R-S; Wooldridge TC1. Movall capacities range from 12 to 26½ yd. struck, with load ratings from 22 to 45 tons. They can be supplied for both new tractors and those already in the fleet. Interchangeable goosenecks enable users to switch prime mover from scraper to Movall or vice versa.

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(POLYVINYLCHLORIDE)

The New Concrete Expanding Joint Waterstop That is Stretching Across the Continent

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3¾ Inch DURAJOINT
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IT'S THE WATERSTOP WITH THE ADDED NEW FEATURES!

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W. J. Burke & Co. in Seattle, San Francisco, Portland, Sacramento, Los Angeles and Albuquerque.
Salt Lake City: Intermountain Concrete Specialties.
Denver: K. C. Construction Supply Co.

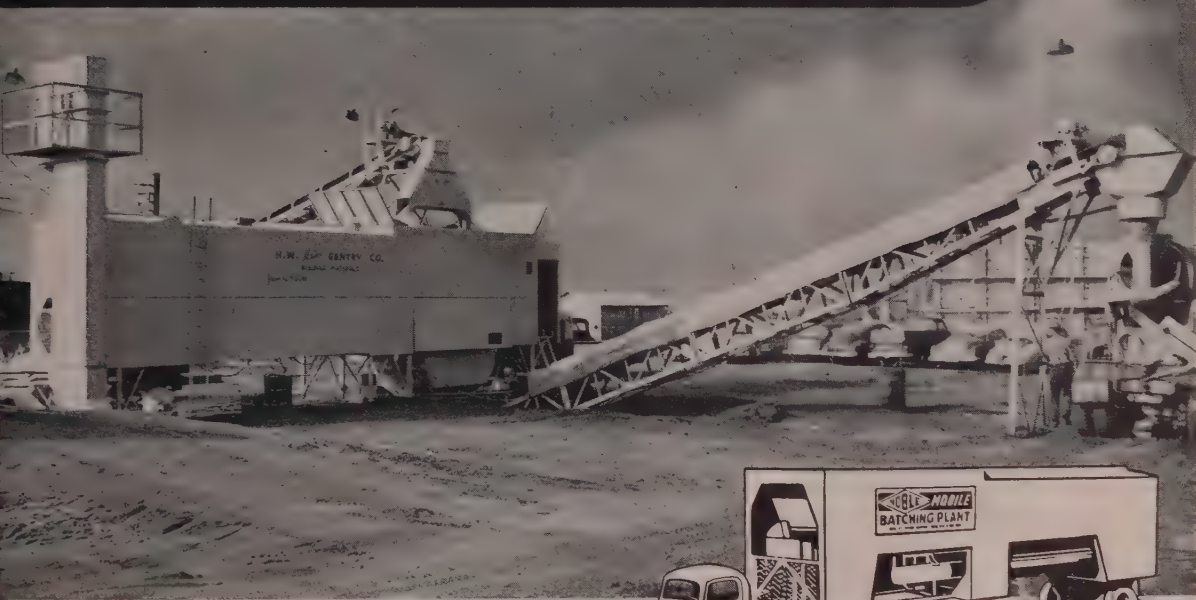
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Hauled along highway like semi-trailer • Set up
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Complete detonation . . . no unexploded caps or powder. Cannot be set off by friction, sparks, ordinary shock; even a direct hit by lightning did not detonate Primacord.

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Contacts every cartridge, even in deck loads. Initiates entire charge almost simultaneously. Can be hooked up to fire front line first, giving relief of burden and better fragmentation.

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PENNZOIL 811 An entirely new multi-purpose lubricant. Adheres to metal surfaces. Will not pound out, gum or cake. For chassis maintenance. Water pumps, U-joints, and covered springs. A supreme quality lubricant.

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ZOILDEEZ Here is the finest heavy duty motor oil available to the construction industry. Leaders in the field say there is nothing like it to keep engines clean and protect against wear.

FOR TRUCKS
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ALL HEAVY
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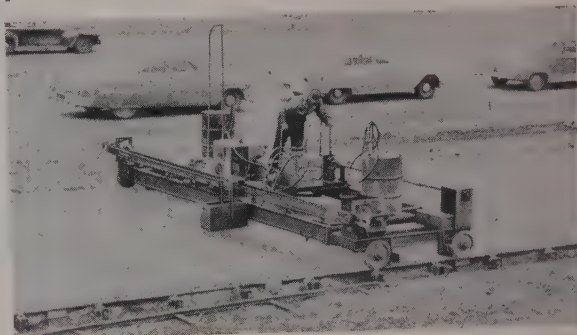
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Automatic spray curing machine for paving

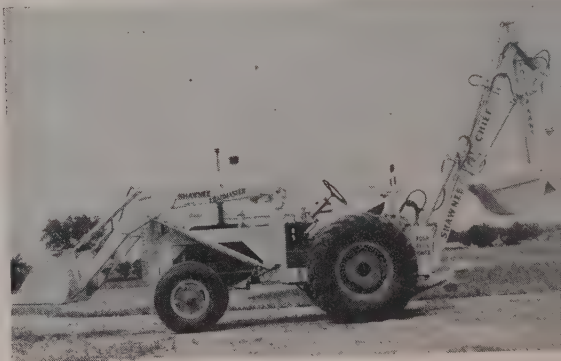
A new line of automatic spray curing machines, designed to provide uniform coverage of concrete in one pass, is announced by General Road Machines, Inc.,



Niles, Ohio. The new rig travels along the form line behind the finisher. Capable of spraying wax or resin based materials as well as white-pigmented curing compounds, it has a single, track-mounted spray head which passes transversely across the surface of the plastic concrete. The spray head, driven by a hydraulic motor through V-belts and a roller chain, travels the full width of the machine. Automatic traversing cycles can be set from 1 to 10 per min. Powered by a 12-hp., 2-cylinder air cooled engine, the spray machine is capable of traction speeds from 5½ to 30 ft. per min. Transmissions provide 3 speeds forward and 3 speeds reverse, with instant reverse under load.

New Shawnee backhoe digs 14 ft.

A backhoe which digs effectively at a 14-ft. level has been placed on the market by Shawnee Manufacturing Co., Inc., 1947 N. Topeka Ave., Topeka, Kan. Model No. D90, the new Chief has an actual reach below ground of 15 ft. To relieve strain on the axis and increase digging pressure, the action of a push cylinder at one end of the bucket boom axis has been synchronized with another pull cylinder midway between the axis and the bucket

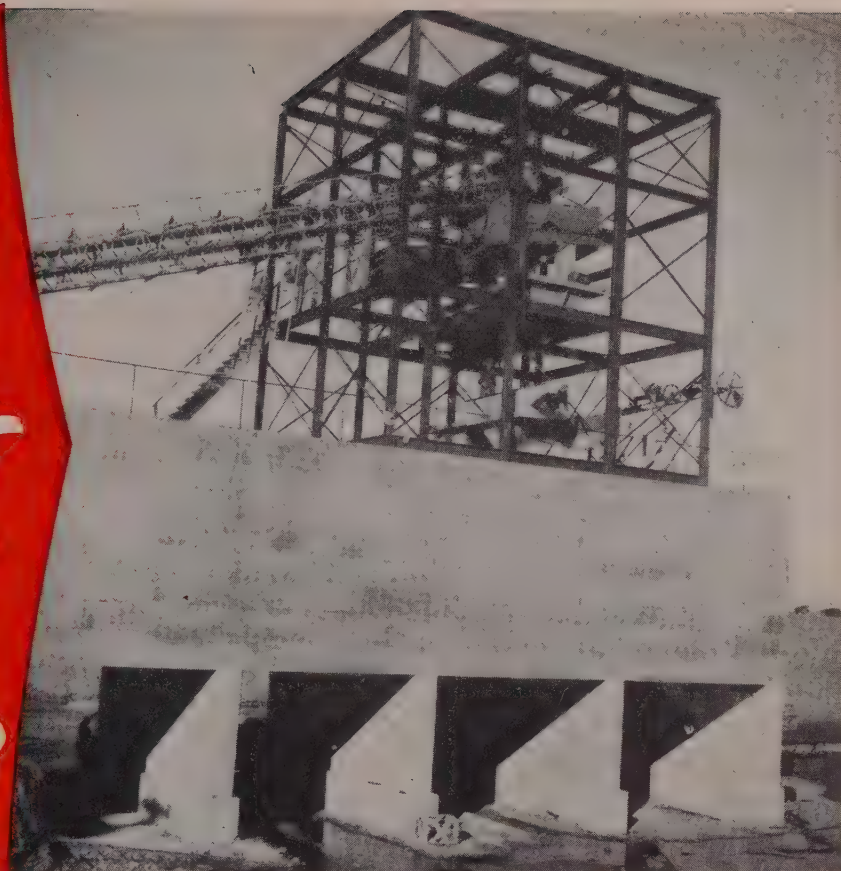


Three 120-deg. quadrants of operating are offered on the backhoe, so the operator can switch to either of the quadrants without moving from the seat. Heavy plate steel is welded to form the box frame construction. The main boom; main frame is constructed of ½-in. plate

Peterson offers pusher-bulldozer for Caterpillar D9 tractor

An inside-mounted pusher-bulldozer, designed specifically for push loading and pit dozing, is now being offered for the big Caterpillar D9 tractor by Peterson Tractor Equipment Co., San Leandro, Calif. The makers claim the unit, by reason of its close-coupled, narrow blade and fast maneuverability, can increase the D9's scraper load

NEW 2,000 T.P.D. PLANT relies on SECO SCREENS



Photographed on the job Preston, Ontario (Pit & Quarry photograph)

PRESTON, ONTARIO SAND AND GRAVEL PLANT A MODEL FOR INDUSTRY

From 150 T.P.D. production capacity in 1949 to 2000 T.P.D. today. This summarizes the remarkable growth story of the Preston Sand and Gravel Company, under the dynamic ownership of Thomas J. McGovern.

When Mr. McGovern took over this business about six years ago, he was determined to get a larger share of the market which meant clean, uniformly sized gravel. The resulting increase in business soon created the need for greater production.

Thus, in setting up the modern continuous flow plant which began operation in March, 1955, Mr. McGovern chose SECO screens for all the screening requirements from scalping to final sizing. Three are set in the superstructure (closed in after the above photo was taken) and the fourth is assigned to the scalping operation.

In Mr. McGovern's own words, "We believe we could not find any vibrating screens to equal our SECO's for satisfactory performance."

Send for Catalog No. 204



Modernize Your Plant For Greater Profits

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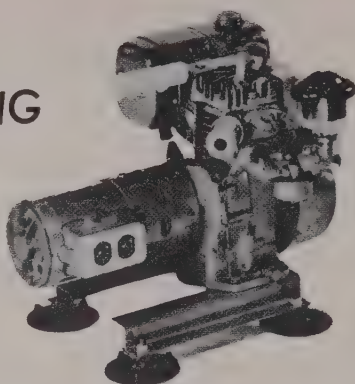
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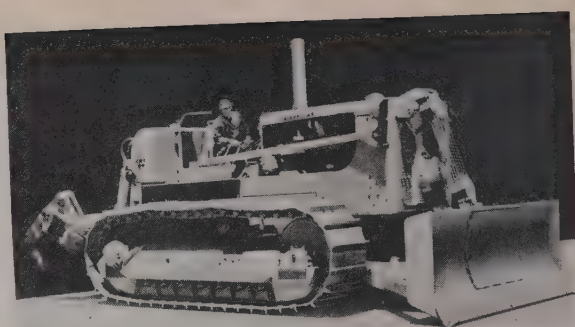
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POWER TOOLS
ON EVERY
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Here's electricity in a tough little plant made for running power tools... carry it to the job, put it in the back of a car, it weighs only 65 lbs. and it packs all the power you'll ever need to run a 7" saw, a 1" drill, an impact wrench, or a small vibrator! This is a dependable electric plant that really does the work—at a cost so low you can have several of them—and put a Tool-King on the smallest jobs as well as large! See the Tool-King in action at your equipment dealers or let us send full details on the Tool-King and other plants in sizes to 3000 W.

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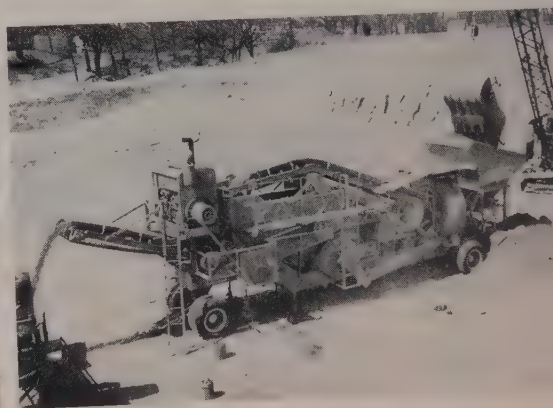
ing potential 10% or more. Blade of the new pusher-bulldozer is 4 ft. narrower, contains heavier steel, and an easily replaceable wear plate eliminates need for auxiliary pusher plate. Overall width of D9 with cable control and mounted pusher-bulldozer is 10 ft.—within special permit clearance and weight requirements—thus enabling user to truck it without disassembly.

Backhoe for TerraTrac crawler tractor

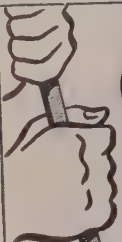
A heavy steel plate boom with a 180-deg. swing and hydraulic foot-pedal control is featured on a new TerraTrac backhoe, designed and built for use on TerraTrac crawler tractors by American Tractor Corp., Churubusco, Ind. The new unit, which has a lifting capacity of 3,000 lb., digs 12½ ft. deep, has a reach of 18 ft., and a clear dumping height of 13 ft. for loading high trucks etc. Buckets from 17 to 24 in. wide are currently available with the unit. Other sizes and types of buckets will be furnished at a later date. Detailed information can be obtained from any TerraTrac dealer and from the company.

Cedarapids Junior Tandem redesigned for greater screening capacity

A larger screening area is one of the new features of the redesigned Cedarapids Junior Tandem crushing and screening plant. According to the manufacturer, Iowa Manufacturing Co., Cedar Rapids, Iowa, a half deck has been added to the horizontal vibrating screen, and the



screen width has been increased by 6 in. over the model. The 42 in. by 10 ft., 2½ deck screen on the unit produce from one to three products simultaneously sizes ranging from 2-in. road ballast down to minus ¾. Crusher sizes can be matched or mixed in any combination to adapt the Junior Tandem to whatever crushing conditions are encountered. Other features include monotype elevating wheel with a drum 78 in. in diameter by 22 in. wide; separate clutch control on the screen; new delivery conveyor backstop.



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WEIGHS 42 LBS.

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Lifts, pulls or lowers 6 tons or more when rigged with tackle blocks.



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can

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*keeps
stainless steel
electrodes "oven fresh"
in re-usable aluminum
container — eliminates
special storage facilities!*

Airco Stainless Steel Electrodes are now packed in seamless aluminum containers. Each "POP" can contains 10 pounds of electrodes, and is sealed with a waterproof airtight industrial tape.

This hermetic electrode packaging technique is the best way to keep stainless steel electrodes "oven fresh" — without benefit of special shop or field storage equipment. Unused electrodes can be kept fresh by resealing the can.

Airco Stainless Steel Electrodes, in the "POP" can, are but one of many types in Airco's complete line that also includes hard-facing, cast iron, mild steel, general, and special purpose electrodes. Send for the free Airco Electrode Guide which will help you select the right electrode for your special job.



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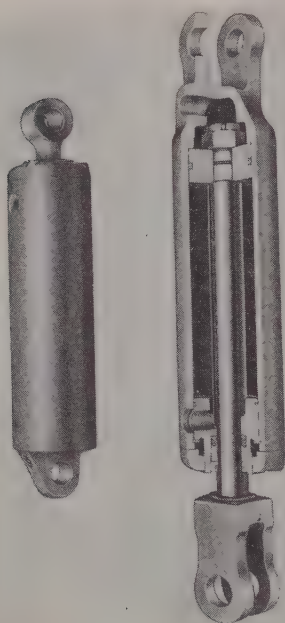
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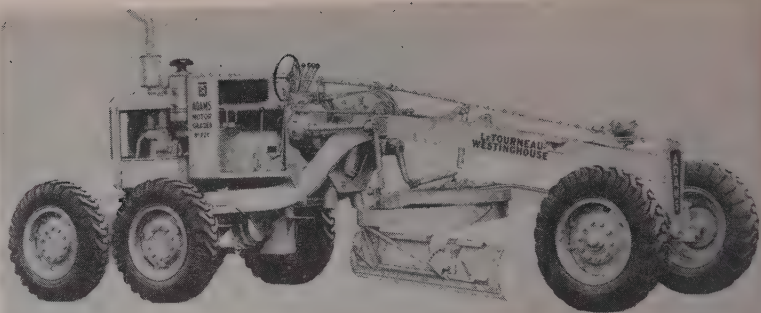
Air Reduction Pacific Company is a division of Air Reduction Company, Incorporated. Principal products of other divisions include: PURECO — carbon dioxide, liquid-solid ("DRY-ICE") • OHIO — medical gases and hospital equipment • NATIONAL CARBIDE — pipeline acetylene and calcium carbide • AIRCO — acetylenic chemicals • COLTON — polyvinyl-acetates, — alcohols, and other synthetic resins.

Heavy duty patented gland cylinders

Densmore heavy-duty, double-acting cylinders employ a patented gland



design and method of pre-stressing the snap ring within the cylinder de-



Hydraulic gears for motor grader

A new motor grader, the Adams 220, has been announced by LeTourneau Westinghouse Co., Peoria, Ill. Designed for general grading and road maintenance, the 220 is powered by a 60-hp. diesel and weighs 14,865 lb. Among the new features in the

220 is a teaming of hydraulic power and mechanical torque in a hydropower gear system which powers both lift and lateral shift of the blade. The blade of the 220 can be moved from a ditching position to full vertical bank cutting on either side in one continuous movement without need for indexing and re-indexing.

signed to provide easy maintenance and perfect rod alignment. These hydraulic cylinders are available from 2½ in. through 4-in. bore and from 1 in. through 18-ft. stroke, and are designed for operating up to 1,500 psi. Literature and detailed specifications available from Densmore Engineering Co., Inc., 235 East Greenleaf St., Compton, Calif.

New Hensley ripper

A new type ripper, designed for speeding up bucket loader operations, has been developed by Hensley Equipment Co., Inc., San Leandro, Calif. Each Hensley bucket loader ripper unit consists of two ripper teeth rigidly mounted 12 in. apart by three 1¼-in. steel spacer bolts. The teeth are equipped with replaceable



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the all new Rear-engine 13¼ yd. International Payloader



PRY-OUT FORCE
International-built 77 net hp diesel engine, short-coupled power train, positive hydraulic lift and 40° tip-back bucket on ground break-out pads combine to give tremendous pry-out force.

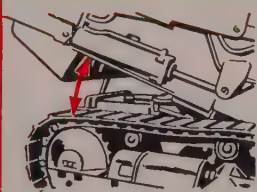
	1st	2nd	3rd
Forward	0-1.6	0-4.5	0-10.1
Reverse	0-2.1	0-5.7	0-13.1

NEW HIGH SPEEDS

The Payloader's top speed of 10 mph forward is nearly three times faster than most other competitive units. Top reverse speed of 13 mph is four times faster.



VISIBILITY
Payloader is always "on top of his work" because of rear-engine design. He works faster with less effort. To shift or dump, he pulls a hydraulic lever. There is no master clutch or steering pedals.



NEW SERVICIBILITY

Only tractor-shovel with tilting body, the Payloader permits mechanic to get at all four sides of engine easily and quickly. Tilting body for servicing takes only a few minutes.

Here's the new tractor-shovel that surpasses all competitive models for speed...gives you fastest loading cycles...yet offers you crawler traction and stability for greater production and more profitable work in any terrain...in any weather. It's the all new, rear-engine, 13¼-yard International Model 12 Payloader...with new, high speeds, unmatched in crawler history...with new pry-out force necessary in rock and other tough materials...with new visibility, a result of rear-engine design...and new serviceability obtained by tilting the body to reveal engine and other components. See all these and many other International Payloader features at your International Construction Equipment Distributor, soon. Then try it! It's so fast...you'll think it's on wheels.



INTERNATIONAL CONSTRUCTION EQUIPMENT

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180 North Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors... Self-Propelled Scrapers and Bottom-Dumps... Crawler and Rubber-Tired Loaders... Off-Highway Trucks... Diesel and Carbureted Engines... Motor Trucks.

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DEPENDABLE POWER FOR INDUSTRY



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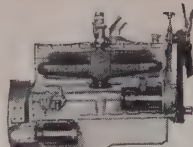
MARINE

OILFIELD

Yes, this is Hercules Motors, today—all types of dependable power for modern industry. The Hercules line includes more than 90 different models of engines and complete power units ranging from 3 to 500 H.P.

An ever-growing list of customers are solving their power problems with these types of Hercules Engines: L-head gasoline, overhead-valve gasoline, natural gas, L.P.G., turbulence-chamber diesels, direct-injection diesels, Turbo-Charged Diesels, marine diesels and complete open, closed and base type power units.

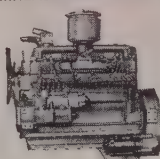
Write for more information on any of these dependable power plants. Our sales-engineers will be happy to help solve your power problems. No obligations, of course.



L-HEAD GASOLINE



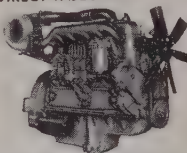
OVERHEAD-VALVE GASOLINE



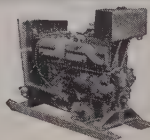
TURBULENCE-CHAMBER DIESEL



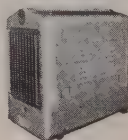
DIRECT-INJECTION DIESEL



TURBOCHARGED DIESEL



L.P.G. OR NATURAL GAS



POWER UNITS



MARINE DIESELS



self-sharpening wearpoints, and are angled downward to provide an 8-in. penetration when the bottom of the bucket is parallel to the ground.

Ready-to-use joint sealer

A new joint sealer for applying cold joint sealing compounds to newly sawed control joints in highways and airport installations is announced by Clipper Manufacturing Co., 2800 Warwick, Kansas City, Mo. The Clipper CP-300 is a low-cost, complete, ready-to-use unit requiring only connection to a suitable air



compressor. It is equipped with an air pump consisting of a 6-in. diam. air cylinder and piston. The reciprocating action is automatically actuated by an air valve. An extension to the air pump is connected to a foot valve. The CP-300 features a check valve with a chopping action which prevents material from going back into the drum.

Heavy duty AR compressors

Atlas Copco Pacific Inc. has announced broadening of its line to include the heavy-duty series of AR compressors designed for rugged construction and operations. It includes six models, ranging in size from 330 to 3,220 cfm., all of the L shaped, two-stage, double-acting type compressor, fully counter-balanced. Units to 800 cfm. in the series are available steel skid-mounted requiring no concrete foundation and permitting the compressor plant to be moved to different sites as work progresses. Illustrated literature on AR compressors is available from Atlas Copco Pacific Inc., 930 Britta Ave., San Carlos, Calif.

HERCULES MOTORS CORP.

Engine Specialists Since 1915 • Canton, Ohio

REDUCE CYCLE TIME BETWEEN CUT AND FILL



GET MORE TRACTION . . . LONGER TIRE LIFE *with* **Firestone** NYLON TIRES

FIRESTONE NYLON TIRES are built to keep your job on the move. They have the extra traction and extra strength needed to reduce your equipment's cycle time and tire costs.

The treads of Firestone Nylon Tires are built to give maximum traction on the toughest haul, and they are extra tough to resist cutting. Double-thick sidewalls give added protection against cuts and snags.

Firestone's Safety-Tensioned *Gum-Dipped®* nylon cord body gives the greatest protection against impact breaks . . . flex breaks . . . heat failures . . . and water damage.

Firestone has a complete line of nylon off-the-highway tires . . . job engineered tires for every piece of earthmoving equipment.

Call your Firestone Dealer or Store for cost-cutting Firestone Nylon Tires and complete off-the-highway tire service.



A TIRE FOR EVERY ROAD, LOAD AND CONDITION OF SERVICE

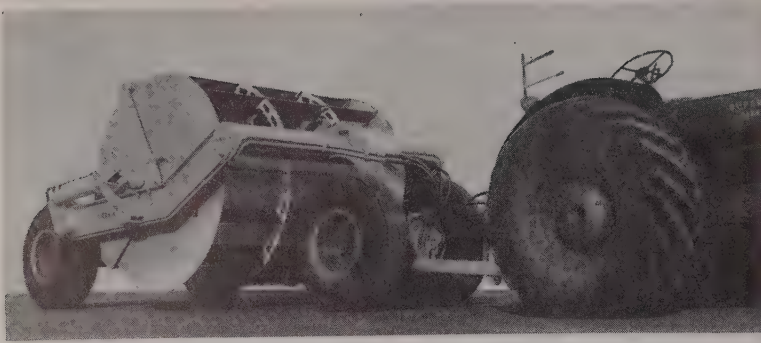


GROUND GRIP GG WIDE BASE ROCK GRIP RG WIDE BASE ALL NON-SKID ALL TRACTION RIB EXCAVATOR

WHEN YOU BUY NEW EQUIPMENT OR REPLACEMENT TIRES, SPECIFY FIRESTONE

Enjoy the Voice of Firestone on radio or television every Monday evening over ABC

Copyright 1956, The Firestone Tire & Rubber Co.



Rotohaul scraper has 6½-yd. capacity

A new Be-Ge Rotohaul scraper, designed for use with 40-60 hp. tractors, has joined the Be-Ge line of tractor-drawn scrapers and earth moving equipment. The Rotohaul has a 6½ cu. yd. struck capacity.

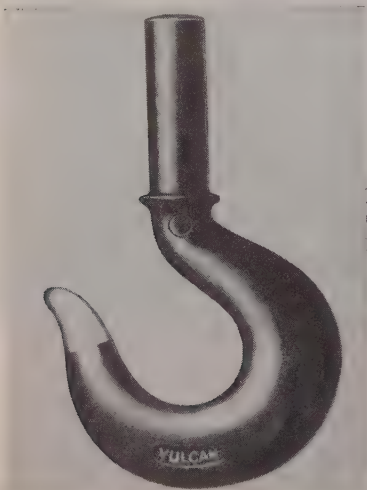
Double cutting action of loading vanes and cutting blade eliminates piling earth ahead of scraper blade, thus permitting high speed loading in third or fourth gear. Depth of spread is from .one to 16 inches. **Be-Ge Manufacturing Co., Gilroy, Calif.**

53-lb. unit drills 26 ft. per hour

Development of a lightweight gasoline-powered rock drill and pavement breaker that can drill up to 26 ft. per hr. through hard granite has been announced by **Atlas Copco Eastern, Inc.** The Cobra, which can drill to a depth of 13 ft. weighs only 53 lb. complete and is powered by a one-cylinder, two-stroke gasoline engine. A floatless carburetor permits drilling in all positions from straight down to 45 deg. upward. The Cobra is available from **Atlas Copco Pacific, Inc., San Carlos, Calif.**

40 and 50 ton hoist hooks

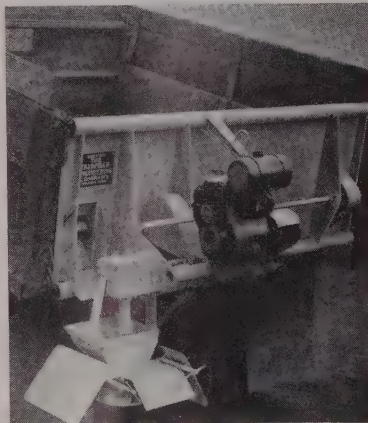
J. H. Williams & Co., 400 Vulcan St., Buffalo, N. Y., has extended its hoist hook line to include 40 and 50-



ton capacity sizes. These hooks are forged in closed dies, in order to bring accuracy and safety to the heavy capacity range of shank pattern hoist hooks.

Spreads salt, sand, cinders

A material spreader that can be used for salt, sand, and cinders has been announced by **Fairfield Engineering Co., Marion, Ohio.** The unit will fit any standard 3-cu. yd. dump



body tail gate and can be installed in a short time. Material controls are operated from the truck cab by the driver. Adjustable baffles control spread width. Complete information available from manufacturer.

Power drive added to Johnson batcher

Latest advancement in roadbuilders' batching equipment announced by the **C. S. Johnson Co. of Champaign, Ill.,** is an optional power-drive arrangement with electric motor for all Lo-Bin batchers. The power unit can be fitted to any Lo-Bin batcher of 22 or 44-cu. ft. capacity or on combination cement and aggregate batchers. The Standard Lo-Bins are equipped for hand-crank operation. Conversion of units in the field to power drive can be done only on late models.

All-purpose chain saw

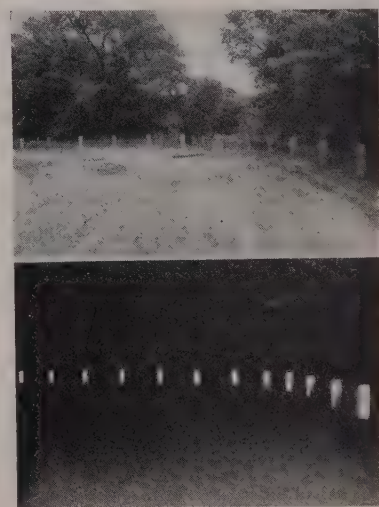
Newest chain saw made by the **Mall Tool Co.** is the model GP, an all-purpose, direct-drive, high chain-speed saw featuring an automatic engine-overspeed controller with no moving parts, an adjustable, fixed-jet, diaphragm type carburetor and high torque engine delivering its maximum power at 5,000 rpm. Introduced on the new saw is a contoured-teeth router chain designed to relieve stress within the teeth before they are sharpened. For more information, write the company, 7725 South Chicago Ave., Chicago 19, Ill.

Peterson dozer for John Deere crawler

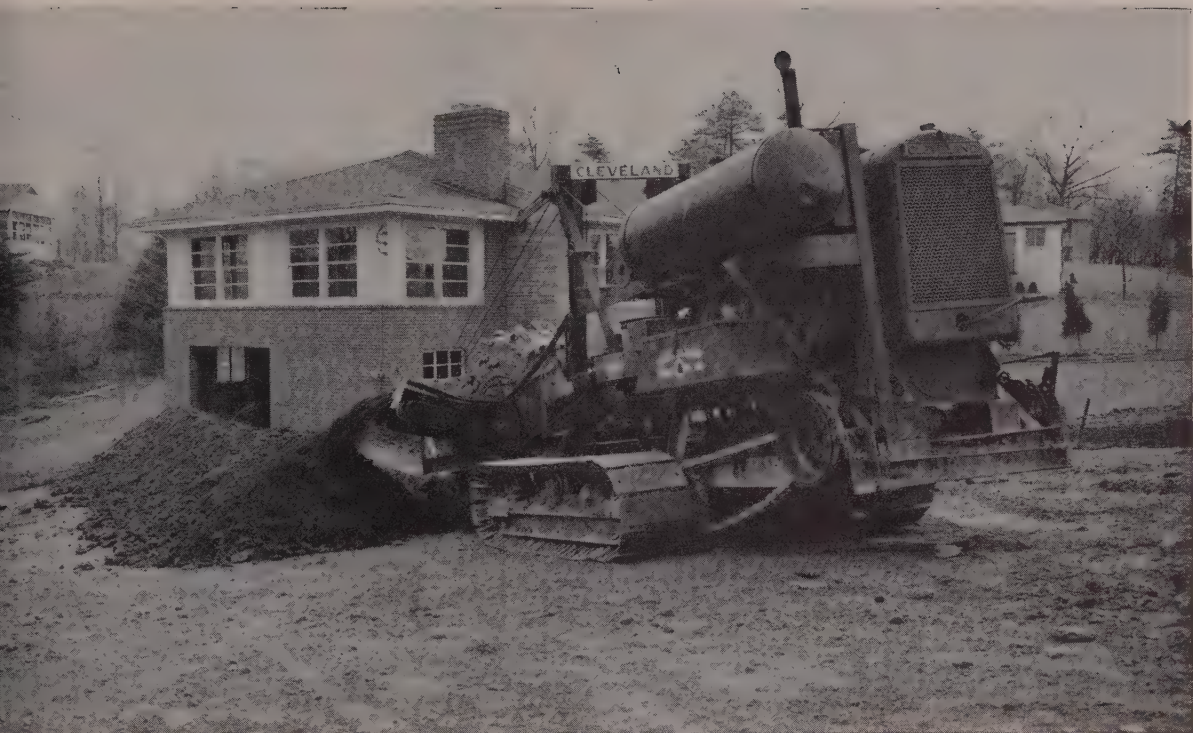
Peterson 420S tilt dozer, built specifically for the John Deere 420 crawler tractor, is announced by **Peterson Tractor & Equipment Co., San Leandro, Calif.** Power tilt enables the operator to tilt the blade while working under full load; either corner tilts 7 in. below the other. The blade is 72-in. long and 25-in. high, has a high lift of 26 in., and maximum digging depth of 15 in. below ground level.

Special reflective liquid kit offered

An introductory offer of a kit containing Codit brand reflective liquid (No. 7210) has been announced by **Minnesota Mining & Mfg. Co., 900 Fauquier St., St. Paul 6, Minn.** Described as an \$85 value, the kit is offered for \$69.50. It contains enough of the fast-drying liquid to reflectorize 2,200 ft. of alternate color curb marking; or 400 sq. ft. of obstruction marking; or 100 12-ft. x 8-in. barricades. During the day, substance appears light gray, blends with concrete or other light-colored objects. At night under auto headlights it re-



fects in silver 50 times brighter than white paint. A 6 x 8-in. application is identifiable as a hazard about 1,000 ft. away under high beam headlights.



...started with a rented CLEVELAND in 1949 ...now we own ten"

SO SAYS HUBERT S. ELEY, vice president and general superintendent of **D. A. Foster Trenching Corp.**, of Merrifield, Va. Today the firm, employing about 200 men in the field, keeps its 10 **Clevelands** (Models 95, 110 and 140), constantly busy on trenching jobs of all kinds. Further excerpts from Mr. Eley's report:

"... we encounter all types of soils and terrain ... swamps, sand, rock, shale, clay ... stumps, boulders and other obstructions ... hill and flat-land ... our **Clevelands** dig them all."

"... we dig a gas or water house-connection in 15-20 minutes with one of our **Clevelands**."

"... on building footings we dig 1,800-2,000 feet of 30" deep trench per day with a **Cleveland**."

"... not necessary to stockpile large amounts of parts for **Clevelands**."

"... fuel costs not a significant factor ... our

Clevelands operate a working week on a tank of fuel."

"... our **Cleveland 140** paid for itself within 30 days."

"... one of the many reasons we prefer **Clevelands** is their all-around adaptability ... besides our utilities work and footings contracts we use them for drainage trenching, septic tank installations and a wide range of other applications."

"... we consider **Clevelands** the best all-purpose trenchers made ... the easiest to operate ... and the longest lasting."



THE CLEVELAND TRENCHER COMPANY

Everywhere

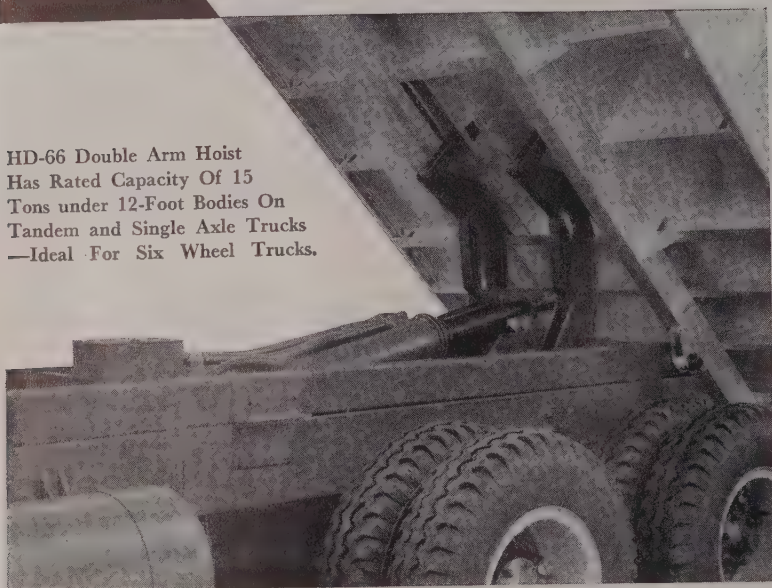
20100 St. Clair Avenue

Cleveland 17, Ohio

Now!

Handle Extra Heavy Payloads with the MARION TWIN 66 HOIST

HD-66 Double Arm Hoist
Has Rated Capacity Of 15
Tons under 12-Foot Bodies On
Tandem and Single Axle Trucks
—Ideal For Six Wheel Trucks.



Extra Profit Features *that Count*

- Low oil pressure operation for smooth lifts without pressure surges.
- Exclusive equalizing double-arm lift hoist provides outstanding performance.
- Rugged, heavy duty pump provides faster dumping cycle.
- Class 12 HABMA rating.
- Economical to operate . . . compact . . . dependable for long life operation.



"Designed on the Job"

MARION

BODIES AND HOISTS

MARION METAL PRODUCTS CO., MARION, OHIO, U. S. A.

A complete line of standard and special hydraulic hoists and dump bodies to fit every need.

Higher compaction through increased rotor weight

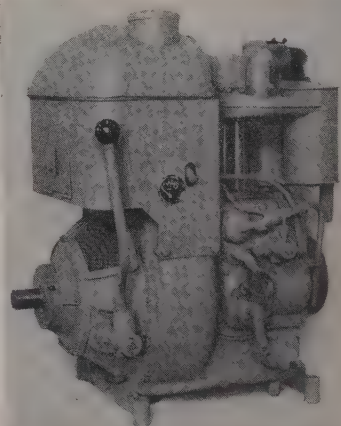
A 17.5% increase of weight of eccentric rotors in the redesigned compaction shoes of the self-propelled VT 6-4 Vibro-Tamper is reported to add over 8% efficiency in the single-lift compaction of sub-base and base courses in highway and runway construction, according to International Vibration Co., Cleveland, Ohio. A 75-hp. industrial en-



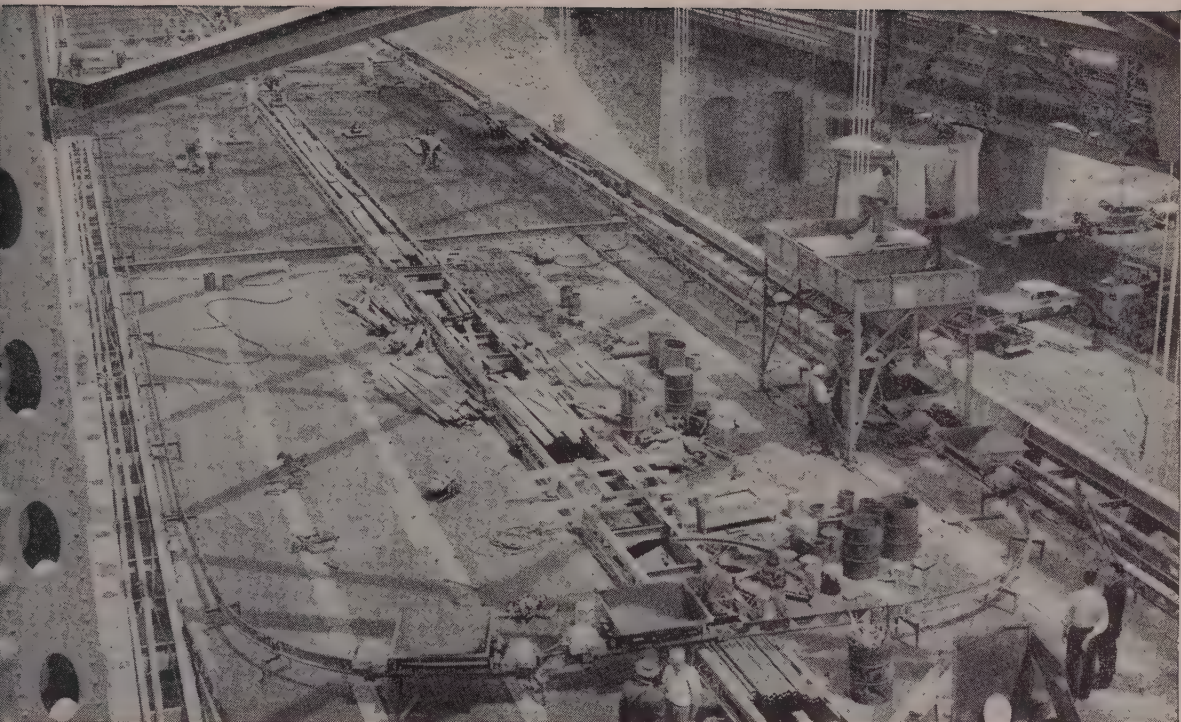
gine powers the machine. Increased compaction is achieved by means of six shoes equipped with eccentric rotors in opposition, V-belt driven from a common floating power shaft. Each shoe provides a dynamic force of over 8,640 lb. at 2,200 vibrations per min.

Diesel engines from Germany

New air-cooled diesel engines for the construction field are being imported by Diesel Energy Corp., 551 Fifth Ave., New York 17, N. Y. Among the models is the Deutz FIL 612 stationary engine which has 8 brake horsepower at 1800 rpm. for



heavy duty, and 9 bph. at 1800 rpm. for light duty. The machine, which weighs 418 lb., has a cu. in. displacement of 46.37. Further information available from Diesel Energy Corp., Dept. RDF, 82 Beaver St., New York 5, N. Y.



Thirty yards an hour around the loop.

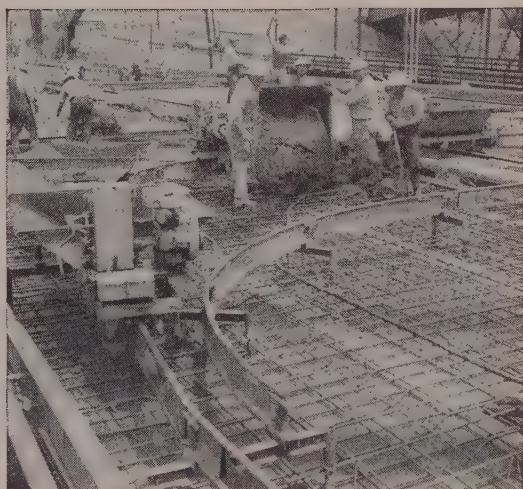
TOLL BRIDGE FAR AHEAD OF SCHEDULE WITH **RAILPORTER**



The deck of the new Kansas City toll bridge is being poured with the aid of CHAIN Belt's new Rex Railporter...and because of this revolutionary new method of concrete transportation and placement, the bridge may be done weeks ahead of schedule! A terrific saving in time and earlier toll revenue. The Rex Railporter, a portable construction materials transport, whisks along with a 20-cubic-foot load of concrete down a single rail from loading bin to pour site faster than you can say "Missouribridgekansascity." The Rex Railporter runs unattended and stops automatically. Two men can easily lay 100 feet of track in less than 20 minutes.

The J. A. Tobin Construction Company, using three Railporters with trailer units on an oval track, pours about 30 yards an hour...the same pouring rate would require ten power buggies.

If you have a concrete placement or materials transportation job over reinforcements, open cuts, muddy terrain, excavations or water . . . investigate the Rex Railporter at your Rex Distributor or write for Bulletin No. 56-47, CHAIN Belt Company, 7601 Telegraph Road, Los Angeles 22, California. Phone RAYmond 3-5227.



Another rail is ready as the pour approaches.



CHAIN BELT COMPANY

Dodge six-wheelers

A new line of tandem-axle 6-wheel trucks ranging from 31,000 to 46,000-lb. maximum gross vehicle weight and up to 65,000-lb. maximum gross combination weight has been intro-



duced by the Dodge Division, Chrysler Corp., Detroit 31, Mich. The six-wheelers are powered by V-8 engines ranging up to 220 hp. and include 5-speed transmissions as standard equipment.

Quick dismantling of front end sweeper

Little Giant Products, Inc., Peoria, Ill., has introduced a new front-mounted Model FM-C sweeper for use with almost any tractor, truck or similar prime mover. It is driven by an 8 hp., air-cooled, independent gas-line engine, and there is no power take-off to attach or detach. Speed of the FM-C brush is constant, controlled by governor settings, and is

entirely independent of the speed of the prime mover. The sweeper assembly can be detached in a few minutes by removal of one kingpin and disconnecting hydraulic quick coupling.

Change on Hopto digger

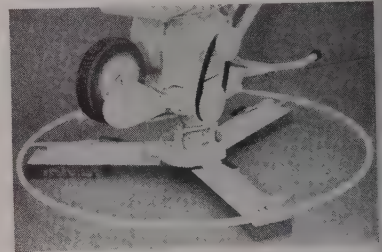
The Badger Machine Co. of Winona, Minn., manufacturer of the Hopto Digger, has announced design and engineering changes on its Model 190 SPC-55. This model is now equipped with built-in hydraulically actuated outriggers. The operator can control each stabilizer individually for leveling the machine on uneven terrain. It comes equipped with an enclosed type boom and 5-in. I.D. cylinders on the hoist, crowd,



and bucket actuating equipment. The new model has a digging depth of 11½ ft. and 190-deg. swing.

Grinding blade for troweler

White Manufacturing Co. of Elkhart, Ind., announces a new grinding blade as an accessory for their model T-1 troweler. The grinding blade uses a 1½ x 3½ x 8-in. grinding block. It attaches to the 36-in. troweler in the same way as the cement finishing blade making it possible to convert



the troweler to a 36-in. grinding or surfacing machine without tools. Literature available.

Folding traffic barricades

An all-steel folding traffic warning barricade for use with Flasher Safety Lights, is announced by R. D. Fageol Co., Kent, Ohio. The Model B barricade features a one piece heavy gage steel body with folding angle iron legs secured by toggle locks. Barricades are available in two sizes: 48 and 60 in. long, both 36 in. high.

New York State engineers build road despite drastic cut in appropriation

AIRPORT construction at Riverhead, Long Island, forced relocation of the Wading River-Manor Road. Plans were drawn up for two 24 ft. lanes, but the original appropriation was sharply reduced.

Engineers of the New York State Department of Public Works altered the plan to cover one 24 ft. lane; selected Bitumuls Emulsified Asphalt with native aggregate for construction of an 8" base; and included a 1" Asphaltic Concrete surface course.

Using Bitumuls, they eliminated the need for costly imported aggregate; held their costs within the new budget.

The compatibility of Bitumuls with local or in-place aggregate is helping Road-builders in all parts of the country stretch available construction dollars. We will supply full details upon request.



Preparing 8" Bitumuls stabilized base



American Bitumuls & Asphalt Company

200 BUSH STREET, SAN FRANCISCO

Tucson, Arizona

Portland 7, Oregon

Inglewood, California

Oakland 1, California

Seattle, Washington

LEADING MARKETERS OF ASPHALTS, CUTBACKS AND BITUMULS - NATIONWIDE



Satisfied customer Art Martinson (right), president of Denver's Kitimat Corporation, and Phil Smith, Mack salesman. There's real friendship between these two—and no wonder! Mack diesels are giving Kitimat . . .



100% more fuel mileage

The Martinson Construction Company of Denver, Colorado, leases a fleet of trucks from the Kitimat Corporation. Originally, the trucks were gasoline-powered units averaging $3\frac{1}{2}$ to 4 miles per gallon—real “profit killers.” Today, Kitimat operates Mack diesels exclusively and averages 8 miles per gallon—for a saving in fuel costs of more than 100%.

As Kitimat president Art Martinson says, “In 1952 we bought our first Mack diesel and got a real lesson in truck economy and performance. Today, we are 100%

Mack—12 mixers, 6 dumpers, and 2 tractors. The fuel savings alone more than justify the higher initial cost of the Macks. Just as important, our Macks give us dependable service, bonus capacities, and lower maintenance costs with a really gratifying minimum of down time.”

Why not cut hauling costs and boost your profits with Macks—trucks that are unmatched for operating economy, stamina, and low maintenance? Like other operators, you'll find that you can't afford *not* to operate Macks. For complete information, contact your local

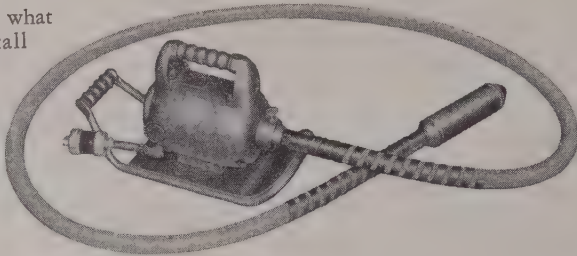
Mack Branch or Distributor. Mack Trucks, Inc., Los Angeles, Denver, San Francisco, Seattle, Portland, Salt Lake City, Albuquerque.

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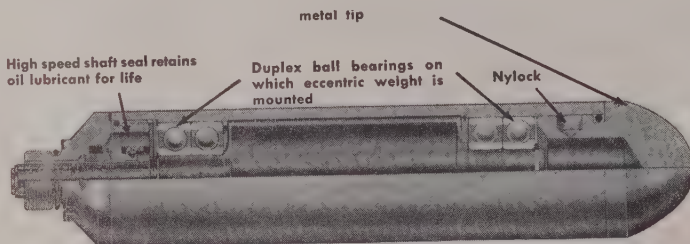
MACK
first name for
TRUCKS

In Concrete Vibrators, it's the WALLOP that counts!

"Wallop," which is what many contractors call amplitude, is what it takes to vibrate a stiff mix—quickly and thoroughly. Recent tests prove that the efficiency of vibration increases in proportion to the amplitude. Therefore, Stow Manufacturing Co., Binghamton, N. Y., has developed a lightweight, rugged electric vibrator that packs a *terrific* wallop.



This wallop is achieved by the unique vibrator head, shown below, driven by a powerful 2 HP motor which delivers 9000 vibrations per minute to the mix.



Take a look at this vibrator head. It is 10 inches long, and available in diameters of 1½, 2 and 2½ inches, capable of 9000 VPM. Vibrations are achieved by use of an eccentric weight mounted in special high speed duplex ball bearings at each end. The outside of the head is case hardened, for extra long wear, and it has a replaceable tool steel tip. Stow estimates that these two improvements alone will double the life of the heads.

CONSTRUCTION MEN report that they like the light weight, the long life, the low replacement cost, and the terrific wallop of these heads. Weight of the 1½" head is about 5 lbs.; the 2" head about 7½ lbs.; the 2½" head about 9 lbs. The cost of this head is less than 1/3 the cost of expensive "motor-built-in" type heads.

For more information about the complete line of STOW concrete electric and gasoline vibrators, vibrating screeds and rotary trowels, contact your STOW distributor, or write for STOW catalog 560.



Hydraulic backhoe for Cat D4 tractor

A hydraulic backhoe of ½-yd. capacity has been announced by **Hyster Co.**, 2902 N.E. Clackamas St., Portland 8, Ore. Designed for the Caterpillar D4 tractor, the new hydraulic D4 backhoe has full track-type tractor mobility, is capable of digging down to 13 ft. and loading up to a height of 9 ft., 7½ in. A rack and gear swing mechanism, operating in



an oil-tight case, provides full swing power at uniform speed throughout a full 240-deg. arc. The unit incorporates an equalizer which allows full track oscillation and may be locked to obtain rigid-tractor stability.

Littleford paver-spreader

A paving-spreading machine that gives compaction up to 80% of large self-propelled pavers with mechanical tampers is being produced by **Littleford Bros., Inc.**, 502 E. Pearl St., Cincinnati 2, Ohio. Patented balancing beam, compaction chamber and adjustable hinged screed permit



75% of the unit's weight, plus the weight of material—approximately 3 tons—to bear directly on the compaction chamber and screed. Features of the new paver-spreader are its pneumatic balancing wheels, chain-hitch attachment, and 16-in. hopper throat. Literature available.

Portable and stationary track pin presses

For removal and installation of pins and bushings of crawler tracks **Lempco Products, Inc.** of Bedford, Ohio, has announced the new model 565 Powermatic track pin and bushing press. Special tools and adapters are available with the press to serv-

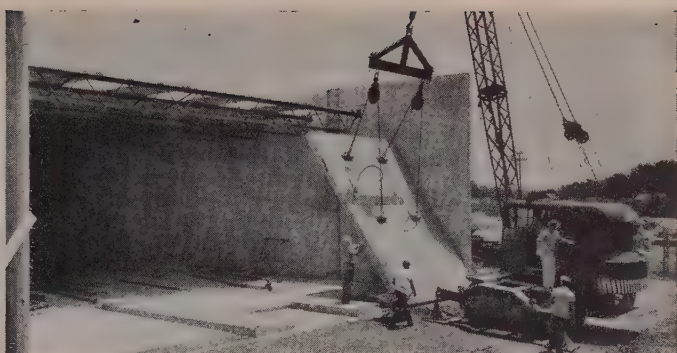


STOW MANUFACTURING CO.

56 Shear St., Binghamton, New York



PANEL with large window areas



WAREHOUSE

DANIEL CONSTRUCTION CO. PHOTO

Tilt-Up Costs Go Down

...with SUPERIOR "Pick-Up" Inserts,
Brace Anchors, and Braces

When an outstanding Tilt-Up job rates an article in a construction publication you can be almost certain that SUPERIOR products were used. The reason is simple. SUPERIOR, as the pioneer in this field, developed designs that were thoroughly tested both in the laboratory and the field to assure safety with economical prices and low application costs.

These "Pick-Up" Inserts, Brace Anchors, and Adjustable Braces have been used and proven on literally thousands of projects, not a few of which were unique in design. With a background of such experience, the recommendation of our engineers as to location and types of Inserts and Anchors is reliable and valuable.

Avoid expensive crane delays, be assured of safety, and reduce your overall costs with these SUPERIOR products.

For further details request a copy of Bulletin TU-3



57 TON SLAB being positioned



DANIEL CONSTRUCTION CO. PHOTO

ADJUSTABLE BRACES used for quick and easy alignment of panels

SUPERIOR

CONCRETE ACCESSORIES, INC.

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SUPERIOR "PICK-UP" INSERTS ...



ANCHORS FOR BRACES ...



ADJUSTABLE BRACES

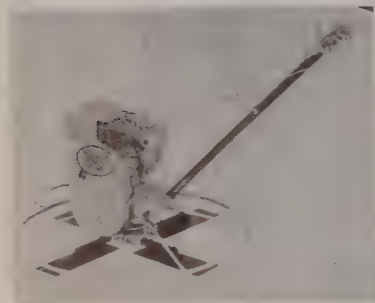
ice tracks from the smallest to largest models of Allis-Chalmers, Caterpillar, Euclid, International and Oliver tractors. The 150-ton hydraulic



press has two ram speeds—180 in. per min. up to 30 tons pressure and 30 in. per min. over 30 tons. Stationary model is electrically powered; a wheel mounted, field model with trailer hitch is powered with gasoline engines.

Muller re-designs power trowel line

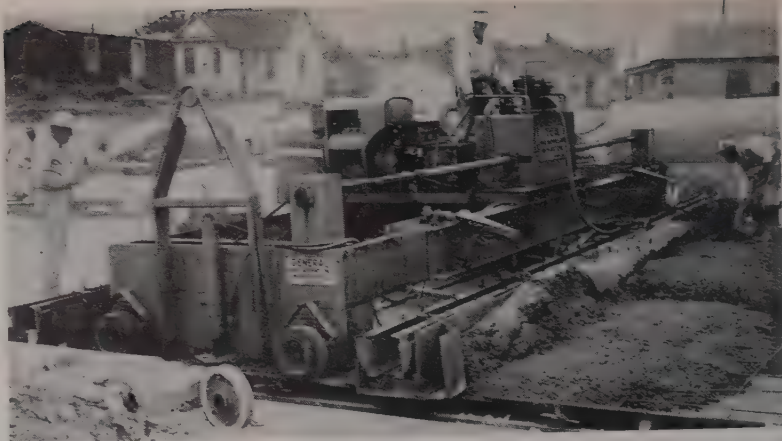
Muller Machinery Co., Inc., Metuchen, N. J., announces the introduction of a new line of power trowels. Most notable feature is the use of four blades, instead of the conventional three, in all sizes—24, 29, 34 and 44 in. The manufacturer states



that four blades reduce vibration and lateral pull away from the work. The new power trowels are equipped with Timken Bearings to maintain accurate alignment of the worm drive. Blade adjustment, engine throttle, and power throw-out are all located at the top of the handle convenient to operator's hands. Separate floating and finishing blades are standard equipment with all sizes.

Side boom for pipelaying

Midwestern Manufacturing Co., Inc., of Tulsa, Okla., has developed a new pipelayer attachment for use with Caterpillar D2 tractors in building small and medium sized gas, water and sewer lines. Known as the No. 2 Side Boom, the new pipelayer has a lifting capacity of 8,400 lb. at 2-ft. overhang. A 1,200-lb. counterweight and long track frame provide needed stability. The new pipeline attachment will be offered through Caterpillar dealers.



Portable screed finisher

A new portable compacting screed finisher, suitable for use on 20 to 32 ft. wide slabs, is announced by General Road Machines, Inc., Niles, Ohio. Known as Model 5-S, the machine has a range of 6 travel speeds

and 24 screed speed combinations. Instant reversing, full hydraulic control of front and rear screeds, plus easy interchangeability of track wheels are features of the new model.

New forming tools

Three new additions to its line of forming tools, a flat tie form, adapter plate and flat tie, have been announced by Symons Clamp & Manufacturing Co., 4249 West Diversey Ave., Chicago 39, Ill. The new flat tie form, designed to be used with the new Symons flat tie, can be stripped by merely disengaging connecting bolts and hinging form away from wall. The adapter plate makes it possible to insert ties internally at various points within the panel by means of the connecting bolt. The new flat tie can be broken $\frac{1}{4}$ in. in the wall with a few hammer blows and can be installed from the outside of the form. Further information available.

Hercules SD dump bodies

A new SD series of general contractor's dump bodies, of 2-cu.-yd. payload capacity and designed for mounting on trucks in the 4,200 to 10,000 gross vehicle weight, is an-

nounced by Hercules Steel Products, Galion, Ohio. Model SD-12, with fixed sides, features one-piece floor and side construction, flanged top rail, full length rub rails, boxed rear corner posts and a flange-reinforced head. Model SD-1 is similar in construction but has fully removable sides and rear corner posts. Offered in 8-ft. length, both models are 78 in. wide.

New bucket from Erie Strayer

Latest addition of Erie Strayer Co.'s line of clamshell buckets is the XLR-38, a $\frac{3}{8}$ yd. extra light rehandler which is made especially for 6 to 12-ton equipment such as Quick Way, Shield Bantam, Sargent, Dixie, Little Giant and Mitey Mite. The XLR-38 comes with or without teeth and counterweights, has a one-piece welded head and wrap-around reeving. A folder describing the XLR-38 is available from Erie Strayer Co., Geist Road, Erie Pa.



Low-bed trailers have removable gooseneck

To round out the Talbert line of low-bed trailers, models are now available with eight or sixteen tires in either 15 or 20-in. diameter wheels and fixed or removable goosenecks with either level or drop decks. By

making use of the Talbert removable gooseneck, the front-end loading of a crane can be accomplished by one man in as little as five minutes. Complete details can be obtained by writing Talbert Trailers, Inc., 7950 West 47th St., Lyons, Ill.

Elevated Steel Tanks

by

**PITTSBURGH
• DES MOINES**

*Symbols of
service
in Louisiana*



Symbols of service to the people . . . in the left distance, the tower of Louisiana's beautiful State Capitol at Baton Rouge, and in foreground, the handsome PDM Steel Elevated Tank just completed for the Greater Baton Rouge Port Commission. • Dependable water service at uniform pressures round the clock is assured by the million-gallon capacity of the Radial Cone tank, elevated on a tower 125 ft to bottom. The tank diameter is 71 ft, with 35 ft headrange. Let us send you our latest Modern Water Storage Catalog.

Barnard and Burk, Consulting Engineers to Greater Baton Rouge Port Comm.

PITTSBURGH • DES MOINES STEEL CO.

Plants at PITTSBURGH, DES MOINES, SANTA CLARA, FRESNO, and CADIZ, SPAIN

PITTSBURGH (25).....3420 Neville Island
NEWARK (2).....219 Industrial Office Bldg.
CHICAGO (3).....1224 First National Bank Bldg.
LOS ANGELES (48).....6399 Wilshire Blvd.

DES MOINES (8).....921 Tuttle Street
DALLAS (1).....1225 Praetorian Bldg.
SEATTLE.....528 Lane Street
SANTA CLARA, CALIF.....627 Alviso Rd.

MADRID, SPAIN.....Diego DeLeon, 60



Power steering for mobile crane

A new-design mobile crane, the Hyster model KE Karry Krane which replaces Hyster's KD model, was recently announced by Hyster Co., 2902 N.E. Clackamas St., Port-

land, Ore. The 10,000 lb. capacity unit is designed to work both within the plant and in yard areas. Features in-

Power spray for tar kettles

clude power steering as standard equipment, trunnion type steering wheels, short turning radius and a rounded rear end design which enables the unit to maneuver easily in crowded storage areas. For reaching into road trucks and box cars, several optional boom lengths adjustable to six positions are available.



Four new portable tar kettles have been developed by Chausse Manufacturing Co., Detroit, Mich. One of the models has a capacity of four barrels and is equipped with a power spray unit for dispersing tars, asphalts and emulsions. Capable of operating a 6 or 8-nozzle spray bar, the spray attachment is powered by a K-90 engine, manufactured by Kohler Co., Kohler, Wis. The four-cycle engine uses gasoline for fuel and develops

3.6 hp. at full throttle. A by-pass with adjustable relief valve allows material to by-pass when the spray bar line control valve is closed, eliminating the need for engine shut-down when spraying is interrupted.

Improvements on Cleveland Formgrader

Latest improvements in the Cleveland Formgrader, a machine that cuts form trenches for road construction, include power steering,

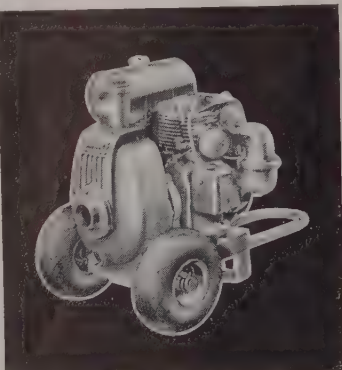


hydraulically operated cutter lift bar and an improved self starter. According to the manufacturer, it is possible to cut 6840 lin. ft. of form trench in six hours. A counter-balanced rear wheel on the cutter side follows in the trench and simultaneously compacts and rolls trench ready for instant setting of forms. Cleveland Formgrader Co., Mills Road, Avon, Ohio.

BARNES

SELF-PRIMING
CENTRIFUGALS

for
dependable
economical
pumping



Suction and discharge sizes from 1-in. to 6-in. Capacities from 3,000 to 90,000 gph. Gasoline, diesel, electric or pulley drives.

See your Barnes dealer or write for Catalog S-2

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



"Forward action" in '56

Central Equipment Co., Berkeley, Calif.

The C. H. Jones Equipment Co., Salt Lake City, Utah

Larson Equipment Co., Los Angeles, Calif.

Lowry Equipment Co., Redding, Calif.

The Rix Co., Inc., San Francisco, Calif.

Write Department L-96 for Details

Special Hoists FROM STANDARD PARTS



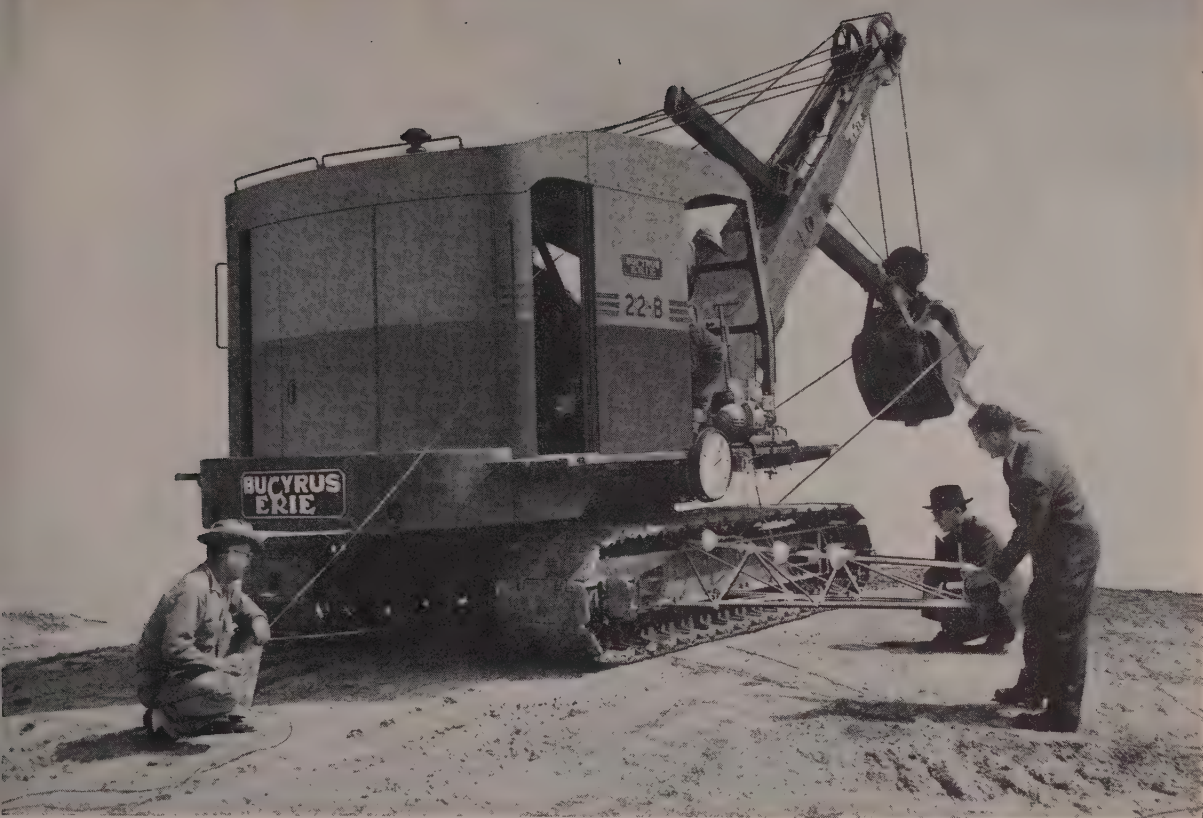
One of Eight Special Electric Incline Hoists with 36" diameter x 26" face drums, built for unbalanced duty of 1,500 lbs. at 200 FPM.

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

WRITE FOR BULLETINS AND CATALOGS

SUPERIOR-LIDGERWOOD-MUNDY CORPORATION

Main Office and Works: SUPERIOR, WISCONSIN, U.S.A.
New York Office, 7 Dey Street, New York 7, N. Y.



Here's **BUCYRUS ERIE** Research Working For You

In the picture above, Bucyrus-Erie research engineers are shown filming the action of crawler links over the driving tumbler of a 22-B excavator as it climbs slopes of varying degrees. This study was part of the exhaustive research which contributed so much to the 22-B's highly efficient crawler design. The conclusions reached from the analysis of this film and from the results of many other tests laid the groundwork for important design improvements.

This is just one example of the extensive research activities and close attention to quality

constantly carried on at Bucyrus-Erie to give you better, more up-to-date excavators and cranes. Put a Bucyrus-Erie to work on your toughest construction jobs; see how the engineering research that went into its development can mean greater profits for you.

For complete information on $\frac{3}{8}$ - to 4-cu. yd. excavators, readily converted to lifting cranes, phone, write or wire the Bucyrus-Erie distributor in your area today. Bucyrus-Erie Company, South Milwaukee, Wisconsin.

22SE56

SEE US FOR COMPLETE INFORMATION

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El Paso, Texas; Carlsbad, N. M.
 Clyde Equipment Company.....Portland, Ore.; Seattle, Wash.
 The Colorado Builders' Supply Company.....
Denver, Colorado; Casper, Wyoming
 Crook Company.....Los Angeles & Bakersfield, California
 Great Northern Tool & Supply Company.....Billings, Montana
 Intermountain Equipment Company.....
Boise & Pocatello, Idaho; Spokane, Washington

R. L. Harrison Company, Inc.....Albuquerque, New Mexico
 Lang Company, Inc.....Salt Lake City, Utah
 Northern Commercial Company
 (For Alaska & Yukon Territory).....Seattle, Washington
 West Coast Engine & Equipment Company.....Berkeley, California
 Westmont Tractor Company.....Missoula & Kalispell, Montana
 Tractor Equipment Co.....Reno, Nevada
 Road Machinery Company.....Phoenix, Arizona

76th Year of Service



to Men Who Shape the Earth



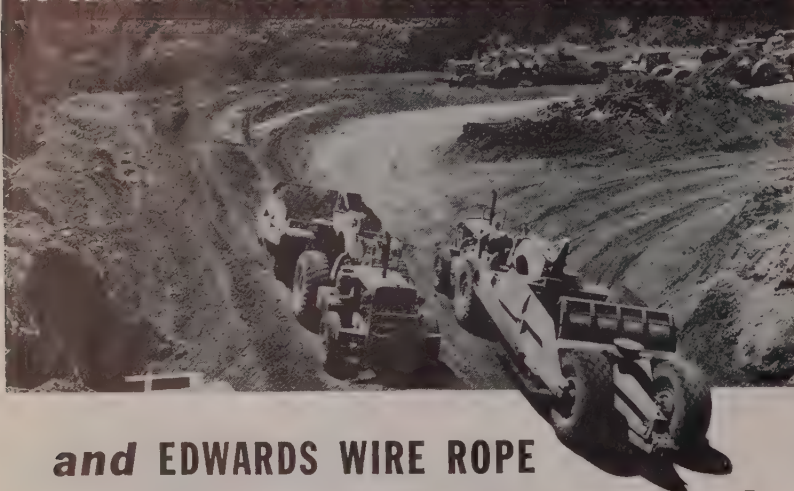
Symons Forms on 2½ Million Gal. Reservoir Tank

Cahill-Mooney Construction Co., Butte, Montana, general contractor, used approximately 5,000 square feet of 2' x 6' Symons Concrete Forms to build this reservoir tank which is 130 feet in diameter and 25 feet high. The tank will hold 2½ million gallons of water, and was constructed for the Butte, Montana, water department.

Symons experienced engineers' ability to tackle and analyze any job, no matter how large or small, is your assurance of efficient, money saving form erection. With your plans, our engineers will prepare a complete form layout, bill of materials, and make recommendations for the most efficient and cost saving method of forming.

Symons Forms, Shores, and Column lamps may be rented with purchase option. Our general catalog is available FREE upon request. Symons Clamp & Mfg. Co., 683 Thornton Street, San Leandro, California.

It takes POWER to move a mountain



and EDWARDS WIRE ROPE is built to handle that power!

Heavy construction equipment is getting bigger, faster and heavier. You need the "built-in" extra performance of Edwards Wire Rope to keep shovels, scrapers and dozers operating profitably.

Call or write today for the address of your nearest Edwards Distributor.

EDWARDS WIRE ROPE

E. H. EDWARDS COMPANY

General Office: SOUTH SAN FRANCISCO, CALIFORNIA

Seattle • Portland • Los Angeles • Houston



Hydraulic tilting for Cat bulldozers

A new hydraulically actuated bulldozer tilting attachment for use with No. 9S and 8S bulldozers has been announced by Caterpillar Tractor Co., Peoria, Ill. The new attachment is designed to give D8 and D9 trac-



tors increased versatility on jobs which require frequent tilting of the blade. Basis of the new tilting attachment is a large hydraulic cylinder which replaces the left bulldozer blade brace. With the right-hand adjusted to its neutral position, either corner of the No. 9S blade can be raised approximately 28 in. above ground level by retracting or extending the tilt cylinder. On the No. 8S, this figure is approximately 24 in.

Twin shaft pugmill produces 350 ton per hr.

A low-cost, high-capacity pugmill, especially designed for the needs of the stabilization mixing field, has just been announced by Barber-Greene Co., 400 No. Highland Ave., Aurora, Ill. The 350-ton-per-hour



capacity of the twin-shaft pugmill offers lower job costs through quicker completion. Thorough mixing of the material is achieved by the twin-shaft pugmill and through the use of a hydraulically controlled, 5-cu. yd. discharge hopper which serves as a dam to control the height of the material in the pugmill and the duration of the mixing time. Additional information available.

Introducing a tough "Lightweight"



NEW Amsco® Manganese Steel LIGHTWEIGHT DIPPER

Rugged $\frac{3}{4}$ yd. dipper, made of the "toughest steel known," actually work-hardens under impact

Those big, tough Amsco Dippers now have a smaller brother. With this new, rugged, lightweight dipper, small shovel operators can enjoy the combined advantages of long-wearing manganese steel and proved Amsco design features, such as:

- One-piece manganese steel back castings
- Arch formed by complete box section for maximum strength
- Teeth are set for clean, fast digging
- Interior is designed for rapid dumping
- Lugs for handle, back, and braces are cast integral with back—for extra strength
- 25% lighter than standard Amsco $\frac{3}{4}$ yd. dipper, per-

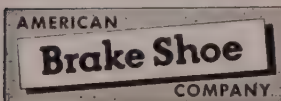
mitting use on light-duty shovels and allowing their developed power to be more fully utilized

- Curved door in back, for full-capacity loading with each pass

Ask your shovel manufacturer for full information—or write us direct for descriptive literature.

"Vital Statistics" on this new lightweight champ

Height of front over teeth.....	4 ft. $\frac{3}{8}$ in.
Height of back.....	2 ft. 7 in.
Opening at top.....	2 ft. 5 in.
Opening at bottom.....	2 ft. 7 in.
Approximate weight.....	1550 lbs.



AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DELAWARE, OAKLAND, ST. LOUIS, JOLIETTE, QUEBEC

News of DISTRIBUTORS

Inland Service moves

Inland Service & Supply Corp. recently moved from 818 So. Main St. to Las Vegas, Nev., to 300 West Wyoming Ave., and marked the occasion with a formal opening on Aug. 3. Dealers in construction equipment, mining machinery, sales and rentals. Inland Service was founded ten years ago by C. K. Christensen.

Seattle AED officers

The Associated Equipment Distributors of Seattle recently chose Jack Sahlberg, president of Jack Sahlberg Equipment Co., to head the organization for the next year. Elected to serve with him as vice president is Fred R. Steckel, president of Universal Equipment Co., and as secretary-treasurer, Austin H. Campbell, construction division sales manager of Air-Mac, Inc.

German diesels in the West

Appointment of Atlas Copco Pacific, Inc., San Carlos, Calif., as distributor for German-made Deutz air-cooled diesel engines distributed nationally by Diesel Energy Corp., New York City, is announced. To date ACP has appointed as dealers Magneto & Diesel Supply, Boise, Idaho; L. A. Jones Co., Salt Lake City, Utah; Pasco Machine Shop, Inc., Phoenix, Ariz., and Diesel Engine Service, Sacramento, Calif.

Rocky Mountain expansion

The H. W. Moore Equipment Co., Rocky Mountain distributor, has recently made many new plans for the organization, including changes in personnel as well as expansion of present facilities. The company has opened a new branch in Durango, to better serve the customers in south-



Moore
Hardesty



Riley
Bickers

western Colorado. This branch is under the direction of Glenn Schroeder. In the sales expansion phase of the company, Ralph Bickers, former South Central salesman, was named assistant sales manager. To fill the gap left by Bickers, Gerald W. Moore was appointed to represent the company in the South Central territory. Two new men recently employed by the firm are Bill Hardesty and Bob

Riley. Hardesty is the new salesman for eastern Colorado, and Riley will act as the new advertising manager in Gerald Moore's stead.

Bob Smith replaces Jim Jacobs

Announcement by Wymont Tractor & Equipment Co., Billings, Mont., was recently made of the appointment of R. M. "Bob" Smith as district supervisor for the northern section of the territory. With many years of experience in the implement business, Smith replaces James Jacobs. Jacobs is now associated with Browning Motors, the Ford tractor dealer in Browning, Mont.

Carrington expansion in Alaska

The Carrington Co. of Seattle, Wash., has purchased the Denali office building and warehouse on the corner of East K St. and Post Road, Anchorage, Alaska. The property has its own railroad spur and 3 ac. of leased land. General sales offices, and parts and service facilities will be established there when details are complete.

Additions to staff

George Brumfield and William Thomas have been added to the staff of Tractor-Equipment Distributors, Inc., Los Angeles, to handle a new division. Company recently took on the Ford industrial engines and power unit line, comprised of heavy duty engines for gasoline, diesel, natural gas and LPG fuels, from 134 to 322 cu. in., and established the new division, known as the Ford Industrial Engine Division, managed by Brumfield.

Name change

As of August 1, Byrne-Ferris Machinery Co., Caterpillar distributor in Spokane, Wash., changed its name to the Byrne Machinery Co.

Notice to publisher of CHANGE OF ADDRESS

NAME _____ Date _____

FROM
(Old address)

Street or P. O. Box Number

City

Zone

State

TO
(New address)

Street or P. O. Box Number

City

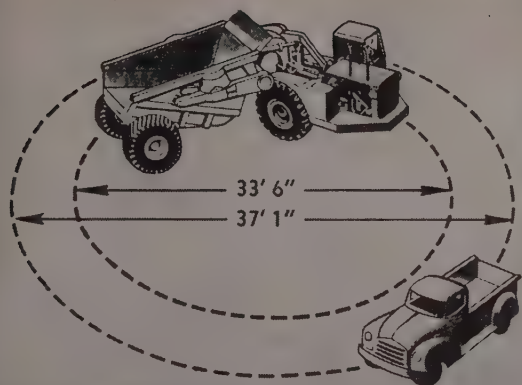
Zone

State

Company _____

Position _____

Mail to: **WESTERN CONSTRUCTION**
609 Mission St.
San Francisco 5, California
Attn: Circulation Department



Athey PR21 TURNS SHORTER ← than 1/2-ton pickup truck

Morrison-Knudsen, Inc. had some narrow ledge work on a railroad relocation job near The Dalles, Oregon. The work required a really sharp-turning, easily handled unit. "Short-turning Athey Rear Dumps solved our problems in cramped quarters," said E. B. Potter, Project Manager.



Tight turning means top production . .

Take a ledge only 34 feet wide in places. Put a 21½ yard shovel on it. The space "left over" is for the hauling unit. That's the problem Morrison-Knudsen faced. The Athey PR21 Rear Dump Trailer supplied the answer.

Large trucks couldn't do the job because they couldn't turn around without complicated back-and-forth maneuvering. The PR21, however, drove in, swung around once, backed under the shovel. No lost time! In fact, the PR21 can turn in less space than a small pickup truck as the sketch at the top shows.

But a short turning radius is not the only outstanding feature of the PR21. It's built to handle big, tough rock or any abrasive material. Hydraulically controlled throughout, one lever dumps the load. The large body is clean and uncluttered—material discharges quickly and cleanly. With the

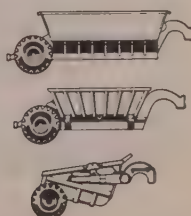
load cradled down between the wheels and the tractor driver wheels well away from the edge of fill or dump, safety is assured. Most important, the PR21 is designed for profitable performance in tough work day after day with a minimum of down time and a maximum of profit time.

Check into the Athey PR21 today! Get all the facts on the trailer that's proved itself a top producer all over the world. See your Athey Dealer for all the facts.

ATHEY PRODUCTS CORPORATION, 5631 West 65th St., Chicago 38, Illinois

Athey

world's finest rubber-tired trailers!



LeT-WesCo line in Arizona

LeTourneau - Westinghouse Co. announces appointment of Road Machinery Co., Phoenix, Ariz., as distributor for LeT-WesCo equipment throughout the state of Arizona. For the past year and a half the Phoenix firm has acted as distributor for the motor graders and TraveLoaders manufactured by the Adams Division of LeT-WesCo, and this latest move adds the Tournapulls, Tournatractors and other equipment.

John Cole receives promotion

W. W. Shepherd, general manager of Shepherd Machinery Co., Los Angeles, announces the promotion of John S. Cole to the post of assistant to the general sales manager. Cole, former industrial salesman, began his career in the earthmoving machinery business with Shepherd in 1952.

Case distributors named

J. I. Case Co., Oakland, has appointed three new California distributors, according to W. F. Carey, district manager. These are Monarch Equipment Co., North Hollywood; Deakins-Lane Diesel Co., El Cajon; and Latham Equipment Co., Gardena.

MANUFACTURERS

Western district representative

Heltzel Steel Form & Iron Co. of Warren, Ohio, announces the appointment of Kenneth Simpson as district representative for the company as well as the Flexible Road



Kenneth
Simpson

Joint Machine Co. in the eleven Western states. He was formerly employed with the Noble Company and Standard Steel Co., both in California. From his main office located in Redondo Beach, Calif., he will handle Heltzel and Flexible complete lines of products.

T. L. Smith opens another plant

The new plant of the T. L. Smith Co. at Lufkin, Texas, was recently

put into operation at appropriate ceremonies. This additional Smith plant has approximately 45,000 sq. ft. of manufacturing space, and 9,000 sq. ft. of offices. In general, it is designed to manufacture the same type of equipment now made by the company in Milwaukee, namely, truck mixers, agitators, stationary tilting type mixers and portable concrete mixers.

San Francisco firm plans move

Ground was recently broken for the new location of San Francisco's E. D. Bullard Co. at Sausalito. The firm is one of the major producers and distributors of industrial safety products.

Key sales promotions

A new slate of key sales officers for the Construction Equipment Division of Blaw-Knox Co., Mattoon, Ill., has been announced by General Manager R. P. McKenrick. Topping the list is L. H. Devilling who has been named division sales manager. For the year immediately preceding he was assistant to the sales manager. Those promoted to product managers are: Raymond E. Hoppenrath (batchers and buckets); H. C. Peters (truck mixers); John Bunder (concrete paving equipment); James H. Coughler (bituminous equipment). Anthony S. Wolf has been named manager of the new Customer Order Service; C. W. McIntyre, manager of the Parts and Services Department. George Moritz, who joined Blaw-Knox in 1955, has been made assistant to the sales manager.

Case enters new fields

Working with manufacturers of allied equipment such as loaders, backhoes, dozers, cranes, etc., J. I. Case Co., farm implement manufacturer of Racine, Wis., is now adapting tractors for work in the construction and industrial fields. Manufacturers of tractor-operated equipment have entered into agreements with Case to make the adaptations necessary on their machinery for use in these additional fields. Under the program the company's tractors become available for powering such jobs as excavating, backfilling, snow removal, lifting and loading earth, etc.

LeTourneau takes on ad man

Stan Fain has been appointed advertising supervisor for R. G. LeTourneau, Inc., of Longview, Texas, according to announcement by Louis A. Flora, advertising manager for the company, which manufactures heavy land clearing and off-road transportation equipment, plus ultra-heavy materials handling equipment.

New sales division formed

As a further step in the reorganization of its sales force to meet the demands of expansion, The Black & Decker Mfg. Co., Towson, Md., has formed a new sales department—the

COST LESS!

White vibrators cost less
to buy, cost less to maintain
HERE'S WHY:

- ... completely interchangeable drives and heads, no special couplings required, less spares needed for maintenance.
- ... heavier eccentric rotors in vibrator heads for better performance in concrete.
- ... power units, either gasoline engine or electric motor, interchangeable.
- ... vibrator heads, from 1 1/2" to 3", and grinding heads interchangeable.
- ... replacement drive shafts cost less.

White MANUFACTURING
COMPANY

ELKHART 15, INDIANA

MODEL ME-13,
with 2 1/2 HP
electric motor
110 V. AC or DC.

MODEL M-9
with 2 HP
Lauson engine,
automatic clutch.

Some Dealer's Territories Available—Write Today

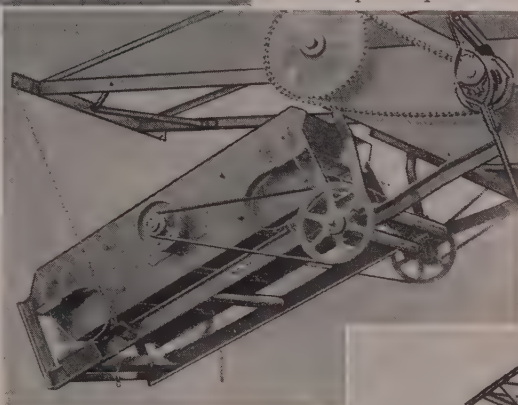
NOW! DOUBLE AND TRIPLE-DECK VIBRATING SCREENS

are available on the

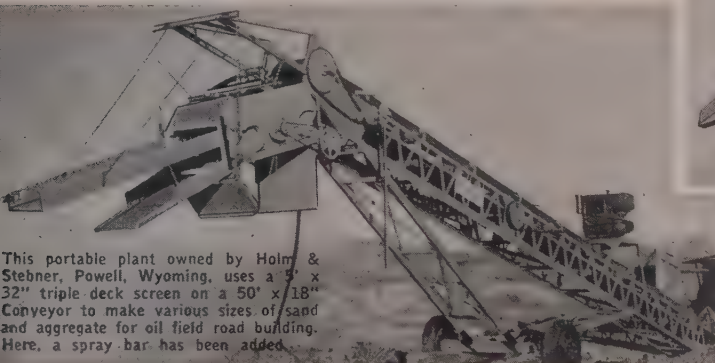
KOLMAN

**COMPLETELY PORTABLE
CONVEYOR-SCREEN PLANT**
CONVEYOR • SCREEN • TRAP • FEEDER

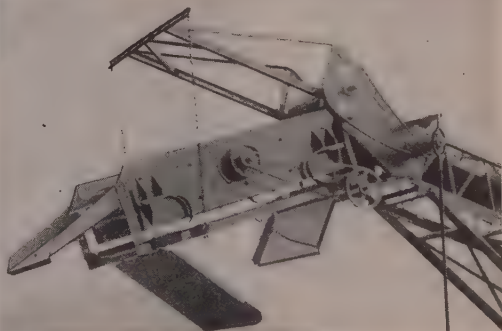
With either a double or triple deck screen on a KOLMAN Portable Conveyor-Screen Plant it is possible to accurately make several sizes of material at one time. The plant has also proved ideal for scalping out oversize and rejecting fines in a single operation. With the top deck removing oversize, the capacity of lower decks for screening fine material is increased. All this in a portable outfit!



The two pictures above show a Type DC 6'x36" double deck KOLMAN Vibrating Screen installed on a 50'x30" Model 101 KOLMAN Conveyor used for loading and sizing coal in one operation by Rasmussen Bros., Sheridan, Wyo.



This portable plant owned by Holm & Stebner, Powell, Wyoming, uses a 9' x 32" triple deck screen on a 50' x 18" Conveyor to make various sizes of sand and aggregate for oil field road building. Here, a spray bar has been added.



Above is a 7'x42" double-deck screen on a 50'x24" Model 101 Conveyor. The owners, Claude C. Wood Co., Lodi, Calif., report excellent results loading and screening aggregate on a central California dam project.

See Your Nearest Dealer

CALIFORNIA

ESNO—Allied Equipment Company,
P. O. Box 871

OS ANGELES—Brown-Bevis Industrial Equip-
ment Co., 6550 E. Washington Street

ARYSVILLE—Valley Truck & Tractor Co.,
100 D Street

AKLAND—Spears-Wells Machinery Company,
1823 West 9th Street

ACRAMENTO—Sacramento Valley Tractor Co.,
Broadway & 19th Streets

IDAHO

MOISE—The Sawtooth Company,
1115 Grove Street

MONTANA

LLINGS—Hall-Perry Machinery Co.,
P. O. Box 1975

BUTTE—Hall-Perry Machinery Co.,
P. O. Box 1367

GREAT FALLS—Hall-Perry Machinery Co.,
P. O. Box 1869

MISSOULA—Hall-Perry Machinery Co.,
P. O. Box 1063

NEVADA

ELKO—A-D Machinery Company,
P. O. Box 231

OREGON

PORTLAND—Contractors Equipment Corporation,
P. O. Box 2191

WASHINGTON

SEATTLE—Air-Mac, Inc.,
3838 4th Avenue South

ALASKA

SEATTLE, Washington—The Carrington Com-
pany, 91 Columbia Street

SEND this coupon for FREE literature

KOLMAN Manufacturing Co.

4300 West 12th St., Sioux Falls, S. D.

Please send free literature on—

- ☐ Model 101 Heavy Duty Conveyor
☐ Model 202 "Junior" Conveyor
☐ Vibrating Screens ☐ Feeders
☐ Traps

Quote..... size or..... capacity

Name

Address

City

Service Sales Division. The new division is expected to be in operation by Oct. 1, at which time John P. Spain will assume the post of service sales manager. Spain is presently Black & Decker's regional manager for the Pacific Coast area. He will be succeeded in this position by Lester C. Kaefer. Kaefer's headquarters are in Los Angeles.

Bethlehem Pacific promotion

J. L. Humphrey, mill engineer at Bethlehem Pacific's Seattle plant, has been appointed manager of industrial fastener sales in seven Western states. He will maintain his headquarters at Bethlehem Pacific's general offices in San Francisco.

Top management elevation

John J. McGlone has been elected vice president of Williams Buckner



John J. McGlone

Division of the Wellman Engineering Co., Cleveland, Ohio. McGlone, who joined Wellman in March 1955, is also general manager.

Novo Pump buys tool company

Frank B. Stallings of Cleveland, Ohio, president of the Novo Pump & Engine Co., announces acquisition of the machine tool and pedestal grinder product lines of the Bradford Machine Tool Co., a 115-yr. old Cincinnati firm. Stallings also stated he had purchased part of the manufacturing facilities of this precision plant which would be moved to Lansing, Mich., to become another "Universal" affiliate.

Caterpillar names S.W. sales mgr.

William E. McCoy has been appointed sales manager of Caterpillar's Southwest Division with headquarters in San Francisco. He succeeds Bernard L. Hagglund who died May 12. McCoy has been with Caterpillar since 1939 and has served in a number of positions. Until his recent transfer to the San Francisco office he was Eastern sales division manager.

M-R-S personnel news

John W. Appleman, of M-R-S Manufacturing Co., has recently been promoted to Western sales manager of the eleven Western states and the western Canadian provinces. Robert T. Hudgins has been added to the sales engineering staff to assist Appleman. Hudgins was for several years employed by the Crook Company of Los Angeles.

B-L-H opens Southwest depot

A direct factory operated warehouse has been opened by Baldwin-Lima-Hamilton Corp. in LaMirada, Calif. This new parts warehouse is located at the Madsen Works, Construction Equipment Division of the Baldwin-Lima-Hamilton Corp., 14120 E. Rosecrans Ave. T. A. Griffin, district manager, states they are fully equipped to give full assistance in the servicing of Lima shovels, cranes and draglines.

Leschen appoints sales reps

Charles L. "Chuck" Swinden and Willard J. Hannon have been appointed sales representatives for Leschen Wire Rope Division, H. K. Porter Co., Inc. Swinden will cover the territory in California from Sacramento in the north to Tulare in the south and from the East San Francisco Bay area through most of Nevada.

International Harvester appoints

International Harvester Co. has named Howard S. Manwaring, assistant director of engineering since 1953, to the position of director of engineering. According to P. V. Moulder, president, Manwaring will place special emphasis on motor truck and construction engineering activities under direction of A. E. W. Johnson, vice president in charge of engineering.

Appointment to Alco sales staff

Alco Products, Inc., announces the appointment of John A. Langford to the company's Los Angeles sales staff.

Thermoid ups Scholz

Announcement of the appointment of Charles M. Scholz as general manager of the rubber division of the Thermoid Company, Trenton, N. J., is announced. Scholz joined Thermoid in August 1954 and became a vice president last May. His earlier rubber experience included that of sales manager of hose and miscellaneous products at Pioneer Rubber Mills, San Francisco.

New branch manager

Sun Chemical Corp., Long Island City, N. Y., announces the transfer of Harry D. Kennedy to the Los Angeles office of its subsidiary, A. C. Horn Co., Inc., as branch manager. He had formerly served as Horn's district sales representative in the Tacoma area in Washington.

Appointment in engineering dept.

Chester D. Christie, staff engineer with the Axle Division of Eaton Manufacturing Co., Cleveland, Ohio, has been appointed assistant chief engineer. He becomes the second assistant chief engineer, along with John L. Davies who has held the post for several years.

H-P-M merged with Koehring

Hydraulic Press Manufacturing Co., Mount Gilead, Ohio, recently merged into the Koehring Company of Milwaukee. The H-P-M company will be operated as a division of Koehring.

New production manager

John V. Banks, graduate structural engineer, has been named production manager of Kaiser Steel Corp.'s fabricating division, Montebello plant. In his new position he will oversee all structural steel manufactured at the Southern California location.

Klevies rejoins Aeroil

Charles E. Klevies' appointment as regional manager, Western Division, for Aeroil Products Co., Inc., So. Hackensack, N. J., is announced by S. Taylor Creighton, director of sales. Klevies is responsible for sales and service in the eleven Western states including operation of the Los Angeles branch office, where he makes his headquarters.

W. L. Shaw transferred West

W. L. Shaw has been named operations manager for Shell Oil Co.'s Los Angeles division, according to R. D. Stetson, division manager. He replaces C. P. Woodward who is on leave of absence. Shaw was operations manager at Boston since 1954.

New R-M sales appointments

J. F. D. Rohrbach, president of Raybestos-Manhattan, Inc., announces the following appointments. H. H. Burrows was appointed senior vice president of the rubber sales division; R. B. Hazard, vice president and sales manager, rubber and packings; S. J. Synnott, assistant sales manager, rubber products; and C. V. Vetell, manager, rubber product sales.

C. G. Turk joins Thew Shovel Co.

Carrol G. Turk, formerly with Martin Machine Co., Kewanee, Ill., has joined The Thew Shovel Co., Lorain, Ohio, manufacturer of Lorain power cranes and shovels.

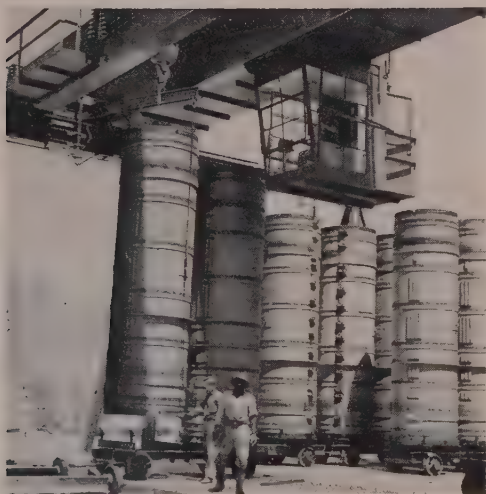
Parsons to build C-R-C ditchers

Joint announcement by the Koehring Company of Milwaukee and Crutcher-Rolfs-Cummings, Inc., of Houston, Texas, has been made of a combined venture to merge certain of activities in connection with the manufacture and sale of machinery used by cross-country pipeline constructors. The move is in the interest of capitalizing on recent individual efforts at product diversification. Koehring acquires designs and manufacturing rights to the C-R-C Big Incher and Middle Incher ditching machines which will be built by the Parsons Company, a Koehring subsidiary. C-R-C will sell these machines as well as the Koehring line of excavators and Parsons Trenchliners to the pipelining industry.



Richfield Form Oil chosen for world's longest bridge

Early phase in construction of 24-mile-long Lake Pontchartrain Bridge, New Orleans.



Forms in which piles are cast have 54" inside diameter, are 16' long. Richfield Form Oil #36 permits quick, clean stripping and insures smoothest concrete finish.



Richfield Form Oil #36 is applied to deck slab form prior to casting. Approximate area of contact is 5370 sq. ft.

THIS GREAT \$46,000,000 pre-stressed concrete bridge is a construction achievement in which builders everywhere may find better ways to do old jobs.

Typical is the fact that Richfield Form Oil #36 was chosen for lubrication of all the steel forms used in casting this structure.

Tests made by Louisiana Bridge Company before starting construction showed beyond question that Richfield Form Oil #36 produced smoother finishes and left forms cleaner than any other oil tested.

For concrete construction of *any kind*, you will want to investigate the advantages of this remarkable oil.

For test quantities, write

RICHFIELD OIL CORPORATION, Lubricants Dept.
555 South Flower Street, Los Angeles 17

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RICHFIELD

"LUBRIPLATE, THE OUNCE OF PREVENTION"

says
VULCAN IRON WORKS, INC.
of Chicago, Ill.

—a leading manufacturer
of pile driving and
extracting equipment

"For many years we have used LUBRIPLATE Lubricants for shop assembly, and have recommended them to our customers through your LUBRIPLATE Tag Plan. Our experience shows that if the proper lubricants are used from the beginning, there are fewer problems and parts replacements later. We consider LUBRIPLATE to be the best possible ounce of prevention."—

H. G. Warrington, Vice-Pres.

**REGARDLESS OF THE SIZE AND
TYPE OF YOUR MACHINERY,
LUBRIPLATE LUBRICANTS
WILL IMPROVE ITS OPERATION
AND REDUCE MAINTENANCE**



**LUBRIPLATE
LUBRICATION
MAKES CARS AND
TRUCKS RUN
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LUBRIPLATE H. D. S. MOTOR OIL . . . needs no additives

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Dodge-Yakima Supply Co., Yakima, Wash.
Fleck Brothers, Ltd., Vancouver, B. C., Canada
Wilkinson & McClean, Ltd., Calgary, Alberta, Can.

LUBRIPLATE
THE MODERN LUBRICANT

Cummer top management

William C. Swalley, 25-year veteran vice president and former general sales manager of Wellman Engineering Co., has resigned to become



Birdsall



Swalley

president of Cleveland's F. D. Cummer & Son Co., well known builder of asphalt plants. R. N. Birdsall, Cummer's general manager and chief engineer, was elevated to the additional post of vice president.

Gar Wood names service manager

Appointment of Robert O'Connell as service manager of Gar Wood Industries' Findlay Division in Findlay, Ohio, is announced. O'Connell was formerly associated with Clark Equipment Co. at Battle Creek, Mich. In his new capacity, he will direct service activities for the full Gar Wood and Gar Wood-Buckeye construction equipment line.

Koehring personnel news

Donald C. Kilpatrick has been named parts sales promotion manager by Koehring Company, long-time manufacturer of heavy-duty construction equipment. Formerly a district representative, he will work out of the firm's main office in Milwaukee. Koehring also announces the appointment of Stewart E. Danby as a district representative. The territory to be covered by him includes Colorado, southern Wyoming, North and South Dakota, Nebraska, Iowa, Minnesota, Kansas and western Missouri.

BFG moves Los Angeles operations

The B. F. Goodrich Co.'s new Los Angeles distribution center recently opened at 3525 Garfield Ave. According to L. T. Greiner, Pacific zone manager of the company's replacement tire sales division, the move into a larger, modern building is a major step in the company's master distribution program aimed to speed customer service through more efficient warehousing facilities. The new center covers 131,000 sq. ft., with 6,150 of that total devoted to offices.

Hedstrom to manage new branch

James H. Flanagan, president of Cummins Service & Sales, Los Angeles, announces that George Hedstrom has been promoted to managership of the company's new branch at Montebello, Calif., to be opened in October.

Bud Madden joins Thew

Wilson H. "Bud" Madden has joined the Thew Shovel Co., Lorain, Ohio, manufacturer of Lorain Power shovels and cranes, as merchandising methods manager. Madden joins Thew with an extensive background in sales engineering, sales and market research, and sales management. Just prior to joining Thew he was vice president of the Quick-Way Shovel Co., Denver, Colo.

Heltzel appoints chief engineer

Appointment of William J. Kirchner as chief engineer of Heltzel Steel Form & Iron Co., Warren, Ohio, was recently announced. He succeeds Fred Mittelstadt, retired. Kirchner has been with Heltzel for the past seven years as design engineer, field engineer and supervising engineer of the bin design section.

Truxell heads Detroit Diesel

Clyde W. Truxell, former works manager of the Detroit Diesel Engine Division of General Motors, has



C. W.
Truxell

been appointed general manager of the Division. He succeeds Semon E. Knudsen who is now general manager of GM's Pontiac Motor Division.

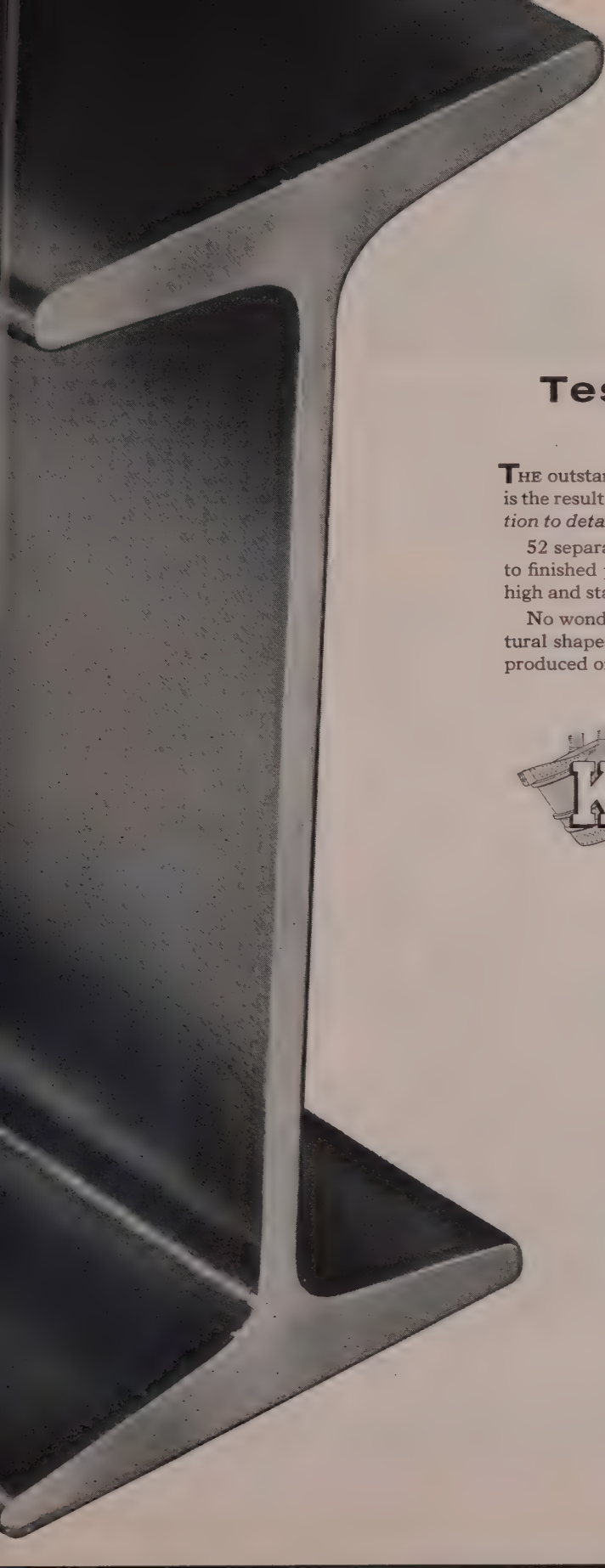
Northwest district sales rep

Spencer T. "Wyndy" Wyndham has been appointed district sales representative for Euclid Division, General Motors Corp., in the territories covered by P. L. Crooks & Co. in



S. T. Wyndham

Oregon and Washington; Evans Engine & Equipment Co. in Washington and Alaska, and Dietrich-Collins Equipment Ltd. in British Columbia and Yukon Territory. Prior to joining Euclid, Wyndham was employed in the Columbia Basin area by the Intermountain Equipment Co., and later from 1951 to 1956 he was Seattle branch manager for Modern Machinery Co. He makes his headquarters at 12844 Shorecrest Dr., Seattle 66.



Tested...52 times

THE outstanding quality of Kaiser Steel structural shapes is the result of master craftsmanship and *everlasting attention to detail.*

52 separate tests, all the way from raw material mining to finished product, help us make sure that quality starts high and stays high.

No wonder western builders rely on Kaiser Steel structural shapes—the most complete line of structural shapes produced on the West Coast.

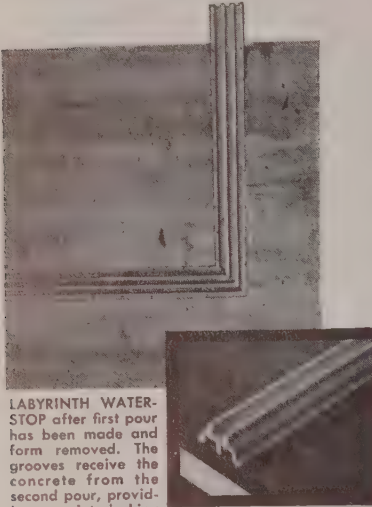


Kaiser Steel

built to serve the growing West



Waterstop in place in seconds!



LABYRINTH WATERSTOP after first pour has been made and form removed. The grooves receive the concrete from the second pour, providing an interlocking joint.

Just a few seconds were needed to nail this LABYRINTH WATERSTOP to the form... just a few seconds and water seepage worries were over before they could ever have a chance to start. LABYRINTH WATERSTOP forms a waterproof bond between two pours. The corrugated ribs bond firmly with the concrete.

LABYRINTH WATERSTOPS are made of flexible polyvinyl plastic... that has superior weathering qualities, is not affected by temperature changes and chemical activity.

LABYRINTH WATERSTOPS are easy to work with, can be cut to any desired length. "L" and "T" joints can be welded with just a hot knife. Find out now how your costs can be cut... and end your seepage problems.

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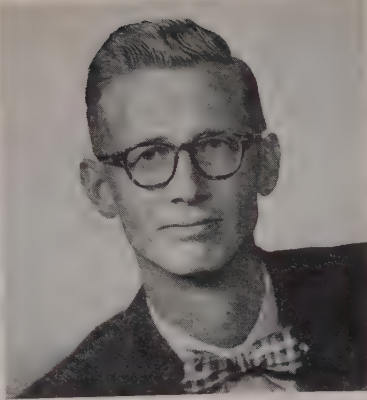
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NEWLY APPOINTED as publications representative for Bethlehem Pacific for the San Francisco district is **Richard E. Hayes**. According to announcement made by **Willard S. Briscoe**, manager of publications, Hayes will handle press relations for the company's steel plant in South San Francisco, fabricating works in Alameda, and other activities of the company in Northern California.

Dealers named for Calif.—N. Mex.

Two firms have been appointed to sell and service Michigan excavator cranes in California and one to sell and service both cranes and Michigan tractor shovels in New Mexico, according to recent announcement by Clark Equipment Co. Buran Equipment Co., Oakland, will handle excavator crane sales in 37 counties in Northern and Central California, besides the western slope of Plumas, Sierra, Nevada, Placer and El Dorado counties. Sierra Machinery Co., Reno, Nev., will handle the counties of Modoc, Lassen, the eastern slope of Plumas, Sierra, Nevada, Placer, El Dorado, and all of Mono. Both companies also sell Michigan shovels. N. C. Ribble Co., Albuquerque, N. Mex., will handle both the excavator-crane and tractor shovel line in the territory north of and including the New Mexico counties of Catron, Sierra, Socorro, Lincoln, Chaves and Roosevelt.

New Lima distributor in N. W.

Evans Engine & Equipment Co., 1230 Westlake No., Seattle, headed by C. R. "Chuck" Evans, president, was recently appointed distributor for Lima shovels, cranes and draglines in western Washington and Alaska, according to W. D. Haley, district manager of Baldwin-Lima-Hamilton Corp., Seattle.

Boise dealer moves

L. D. Meyers, manager, Allis-Chalmers Mfg. Co., Pocatello, Idaho, announces the Southern Idaho Equipment Co. of Boise, A-C dealer for Boise and surrounding territory, has moved into a newly constructed building at 204 E. Myrtle St., and celebrated the occasion with an open house.

New multi-million dollar plant

Air Reduction Pacific Co. will build a new air liquefaction plant in the Los Angeles area as announced by John A. Hill, president of Air Reduction Co., Inc., New York, N. Y. Scheduled for completion the second half of 1957, the new facilities will cost in excess of \$7,500,000. Air Reduction Pacific, headed by H. P. Etter, president, with headquarters in San Francisco, is the parent company's West Coast industrial gas and welding products division. The Los Angeles district, in which the plant will be located, is under the supervision of E. W. MacCorkle, vice president.

More cement for the West

A new sixth kiln, the latest unit in Permanente Cement Co.'s \$35,000,000 expansion program, recently went into production at the company's plant near Los Altos, Calif. "Installation of the sixth kiln and related equipment was rushed to completion to meet requirements of the 1956 construction season," said Henry J. Kaiser, chairman of the board and president, "in order that Western builders would not again be plagued with the cement shortage that seriously limited last year's construction activities."

Austin-Western promotions

J. Arthur Fitzenz has been appointed manager in charge of domestic sales of the products of Aus-



J. Arthur
Fitzenz

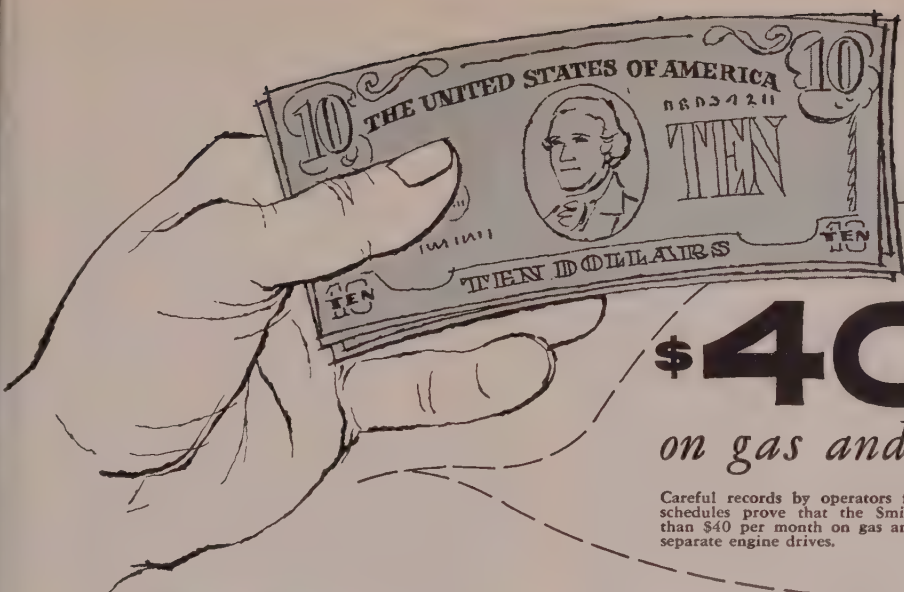
tin-Western Works, Construction Equipment Division, Baldwin-Lima-Hamilton Corp., Aurora, Ill. A Merrill Smith has been appointed assistant sales manager.

Joy district manager

George A. Ward is the new district manager of Joy Manufacturing Co. at Denver, Colo. The former manager, John H. Emrick, is now a consulting engineer.

Blaw-Knox news

William J. Conway, sales engineer, has been named assistant to John P. Cullen, West Coast manager of Blaw-Knox Co., San Francisco. He will assist on equipment sold through the Blaw-Knox Construction Equipment Division at Mattoon, Ill., and Blaw-Knox Equipment Division, Bawnox, Pa. Recently appointed a B-K distributor is Hatten Machinery Co., Seattle, Wash.



save

\$40 per month

on gas and oil alone

Careful records by operators for a full year of tough schedules prove that the Smith Integral* saves more than \$40 per month on gas and oil alone compared to separate engine drives.

It's the "engine loafing" that hikes maintenance costs

With a separate engine drive, high maintenance results from *loafing* the truck mixer engine—not from working it to death.

The Integral NEVER LOAFs

In the Integral, the truck engine always operates at efficient speeds. Carbon buildup is eliminated.

There is plenty of horsepower from the truck engine alone because the *only times extra power is needed, the truck is standing still*. This is for charging and discharging. Full horsepower from the truck engine is thus available for both operations. Once the drum starts revolving, only about 5 to 10% HP is taken from the engine.

If you don't need two engines, why pay for two? *One* is actually more efficient.

Write for full details about the cost-saving Integral.

Since 1900, the pioneer designer and foremost manufacturer of the world's finest mixers.



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ONE FRAME FOR BOTH TRUCK AND MIXER

ONE ENGINE FOR BOTH

*TRADE MARK



THE T. L. SMITH COMPANY, Milwaukee 45, Wisconsin; Lufkin, Texas

Affiliated with Essick Manufacturing Company, Los Angeles, Calif.

Ad No. A8784-1P

September 1956—WESTERN CONSTRUCTION

155

Bur. of Recl. projects

(Continued from page 90)

mately serve 96,000 ac. of which 24,000 ac. are presently irrigated.

Central Valley Project, Calif. \$20,172,000; to award prime contract early in calendar year 1957 for construction of Trinity Dam and Reservoir, and other work on the Trinity River Division. Complete Folsom power facilities. Continue present contract to work on the Sacramento Canal. Continue work on the Shafter-Wasco and Southern San Joaquin Municipal Utility District distribution systems along the Friant-Kern Canal, adding 1,500 ac. to the 430,000 ac. already being served by project facilities. Completion of scheduled work during the year will provide supplemental water for 4,000 additional acres and 4,500 ac. ft. of conserved water for municipal and industrial development.

Ventura Project, Calif. \$6,451,000; for construction of Casasas Dam, major feature of the project—an \$8,576,388 contract which was authorized for award by the Bureau of Reclamation within a few hours after President Eisenhower signed the public works appropriation law making funds available. The project will supply 15,600 ac. ft. of urgently needed municipal and industrial water for the area, about 60 mi.

northeast of Los Angeles, as well as irrigate about 13,200 ac.

Collbran Project, Colorado. \$1,000,000; to complete preconstruction activities and award contract for Vega Dam in October 1956 and award contract for first section of the Southside Canal in May 1957. Program contemplates full irrigation of 2,310 ac. and supplemental irrigation of 18,340 ac. in the spring of 1960. Generating units of the Upper and Lower Molina powerplants will be placed in service during June of 1961, to make 13,000 kw. available.

Colorado-Big Thompson Project, Colo. \$594,480; for initiation of construction on the Colorado-Big Thompson powerplant (4,500-kw. capacity), switchyard, and connecting transmission line, which are the last features of the virtually completed project.

Michaud Flats Project, Idaho. \$2,522,304; to continue construction on pumping plant, wells, canals, and other irrigation facilities to serve 11,550 ac. when completed in 1958.

Minidoka Project, North Side Pumping Division, Idaho. \$2,780,550; to complete construction on Unit A pumping plant, and continue work on wells, canals and laterals. Full irrigation will be provided for 22,132 new ac. in 1957, to permit homesteading on 225 farm units with additional acreage to follow in 1958-1959.

Palisades Project, Idaho-Wyom-

ing. \$6,007,000; to continue construction of the Palisades Dam, powerplant, switchyard and transmission line. When completed, this project will supply supplemental water for 650,000 ac. of irrigated land and have 114,000 kw. of electrical generating capacity. The first power will be generated at this plant in December 1956, and first storage of water in the spring 1957.

Rathdrum Prairie Project, Hayden Lake Unit, Idaho. \$223,000; to start emergency rehabilitation of privately constructed irrigation development, with award of first contracts in April and May 1957. Congress "wrote in" \$520,000 program in Bureau's money bill. Work involves rehabilitation of pumping plant, storage tank, and distribution system.

Middle Rio Grande Project, New Mexico. \$3,523,000; channelization improvements will continue to be extended in the Socorro area and will be completed in the Espanola Valley area. Bureau rehabilitation and extension of irrigation facilities to be completed through fiscal year 1957 will more adequately utilize the water supply for 45,000 ac. of presently irrigated land.

Deschutes Project, North Unit, Oregon. \$1,034,768; for continuation of construction of Haystack Dam and Equalizing Reservoir, started last year and scheduled for completion in fiscal year 1958.

Grants Pass Project, Savage Rapids Dam, Oregon. \$166,000; to initiate installation of fish protection facilities at Savage Rapids Dam.

Rogue River Basin Project, Talent Division, Oregon. \$2,400,000; to initiate construction during the summer of 1957 on the Howard Prairie Dam and Reservoir and for Keene Creek Dam and Reservoir. Collection canals, delivery canals and laterals, and the Green Springs powerplant will be started during fiscal year. When completed, project facilities will provide an adequate water supply for 18,020 ac. of irrigable land, and have 16,000 kw. of installed power capacity. Under the currently proposed program, full production from the powerplant and part of the irrigation benefits will first be realized late in fiscal year 1959.

Provo River Project, Utah. \$985,000; to continue construction work on the Deer Creek powerplant and appurtenant facilities. Accomplishment of the 1957 program will result in the powerplant being placed in operation, with 5,000 kw. of power being made available during the first quarter of fiscal year 1958.

Weber Basin Project, Utah. \$10,066,000; for initiation of construction in December 1956 on the Wanship and Gateway power facilities which, when completed the following year, will have an installed capacity of 5,400 kw.—to be used primarily for project pumping. Also for continuation of going work on irrigation facil-

(Advertisement)



Driving batter pile of trestle for the St. Lucie Canal Bridge in Florida. Schedules called for driving 42,000 lin. ft. of these 33-ft. light wall steel pipe piles in 90 days through a tight saturated formation of seashells, sand and marl underlying the top 6 to 8 ft. of matted vegetable matter and sand. Skillful work by the contractor, Paul Smith Construction Company, and the powerful blows of a McKiernan-Terry S5 Single-Acting Pile Hammer powered by a McKiernan-Clayton Steam Generator completed this difficult task successfully within the time limit, with piles being driven at the rate of 30 ft. in less than 10 min. driving time. McKiernan-Terry Corporation, 24A Mercer Street, Dover, New Jersey.

CELLULAR PIERS, 85% buoyant, are one of many features distinguishing the new bascule bridge across Seattle's Duwamish River. Although each pier weighs 19,000 tons, the "hollow boxes" impose a burden of only 1,000 psf on the river floor. Connected by longitudinal struts, the two piers rest on the bottom without benefit of pilings or foundations. To reduce steel erection costs, the 2 approach spans were erected on scows, then ferried to the site. A 6-foot tide neatly lowered the structures onto their shoes.



High strength steel bridge "floats" on hollow piers

With a yield point $1\frac{1}{2}$ times greater than carbon steel, USS Tri-Ten "E" steel is becoming a new standard in bridge design. Used to meet ASTM specification A-242, Tri-Ten "E" steel's high strength cuts down on the amounts of steel needed. Tri-Ten "E" presents resistance to atmospheric corrosion equal to 2 times that of carbon steel. In the case of Seattle's new First Avenue S. Bridge, USS Tri-Ten "E" was used for the top and bottom cords, web members and gusset plates. As this use of Tri-Ten reduced deadweight, less camber was required in the structure.

Work on the \$6.5 million bridge started in December 1953, with completion scheduled this fall. Alton V. Phillips Co. was contractor for steel superstructure. Structural steel was fabricated by United Concrete Pipe Corp., Fabricated Steel Div.

free booklet!

WC-9

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COLUMBIA-GENEVA STEEL DIVISION
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When bridge designs can be simplified...

Have better appearance... require less maintenance...

Yet cost less to build...

WHY
shouldn't you design more for welding

Ask

**THE
LINCOLN ELECTRIC
COMPANY**

Cleveland 17, Ohio

*Pioneer in Welded Structural Design
... for Lower Cost*

ities, which will provide supplemental irrigation water to 2,000 ac. and 10,000 ac. ft. of municipal and industrial water in fiscal 1957.

Chief Joseph Dam Project, Foster Creek Division, Washington. \$1,283,000; to complete work on pumping plant, distribution system, and main pipeline of the Bridgeport Bar unit. Initiation of work on Brewster Flats pumping plants, distribution and transmission facilities. Completion of the work on Bar area of the Bridgeport Bar unit.

Columbia Basin Project, Washington. \$14,561,402; completion of laterals for serving an additional 47,000 ac. in 1957. Continuation of construction of additional distribution facilities to serve 44,000 ac. in fiscal 1958. and additional acres in subsequent years.

Yakima Project, Kennewick Division, Washington. \$1,288,085; for completion of the pump discharge line for the Amon Relift pumping plant, and completion of distribution systems. The fiscal year 1957 program will make water available to 10,730 ac. for full water supply and 4,637 ac. for supplemental water.

Yakima Project, Roza Division, Washington. \$1,726,154; for continuation of Roza powerplant, with a capacity of 11,250 kw. to be completed in fiscal year 1958 and initiation of drainage works.

Eden Project, Wyoming. \$1,079,000 for continuation of work on distribution system and start of Little Sandy Diversion Dam and Little Sandy Canal in March 1957. Work continues on laterals and drains with award of additional drainage contract in September 1956.

Shoshone Project, Wyoming. \$554,000; for repair and relocation of river outlet works and power-penstock trashrack modification on Buffalo Bill Dam.

Missouri River program

Glendo Unit, Wyoming. \$11,012,000; for continuation of Glendo Dam, highway and railroad relocation, and foundations for Glendo powerplant. Contracts to be awarded in September 1956 for completion of Glendo powerplant, switchyard, and installation of equipment. Contract to be awarded for Fremont Canyon powerplant and equipment in December and October 1956, respectively.

Hanover-Bluff Unit, Wyoming. \$640,000; for completion of pumping plants, canals, conduits, laterals and other principal features of Highland-Hanover and Bluff areas. Work to be completed to permit delivery of water to 7,395 ac. in April 1957.

Helena Valley Unit, Montana. \$3,199,000; for continuation of Helena Valley pumping plant and to start tunnel in September 1956. Award of contract in March 1957 for Helena Valley Dam and regulating reser-

voir. Start of canals and laterals in spring of 1957.

Lower Marias Unit, Montana. \$115,000; for cleanup work on Tiber Dam and Reservoir. Tiber Dam will be operated for first full year in fiscal year 1957. This unit will ultimately serve 127,000 ac. when irrigation system is constructed.

Owl Creek Unit, Wyoming. \$1,005,000; to initiate construction on Anchor Dam and Reservoir and complete Lucerne pumping plants, canals and conduits.

Colorado River program

Glen Canyon Unit, Arizona-Utah. \$9,277,000. Award of the prime contract on Glen Canyon Dam and Reservoir and the Glen Canyon powerplant is scheduled for March 1957. This will be preceded by a start of construction on the access road and Glen Canyon Diversion Tunnel in October 1956. Construction of administration buildings, municipal water supply and sewer system will start in February 1957, and housing units will start in October 1956.

Flaming Gorge Unit, Utah-Wyoming. \$1,300,000. Start of construction on the Flaming Gorge Dam access road and temporary bridge is planned for October 1956. Construction is scheduled to start on the diversion tunnel in May 1957, and on temporary housing units and administration buildings in April 1957.

Navajo Dam Unit, New Mexico-Colorado. \$800,000. Start of construction on Navajo Dam and Reservoir and the administration building and warehouse is scheduled for May 1957. Work on the access road will start in February 1957 and on housing units in April 1957.

Imperial Valley site for Naval Air Bases

THE IMPERIAL VALLEY, Calif. may be the site of a \$5,000,000 to \$10,000,000 Naval expansion program. According to Capt. J. B. Vredenburg, commanding officer of the Naval Auxiliary Air Station in El Centro, Calif., air bases at El Centro, Calif. and Fallon, Nev. may solve the problem of congested aviation activities in California's coastal areas. A jet plane, he said can reach a carrier 100 mi. at sea within approximately 25 min.

Speaking to members of the Imperial Valley Navy League, he stated that within the next two years \$5,000,000 to \$10,000,000 would probably be spent for such projects as more runways and housing. At present, major operations at the El Centro base include bombing and gunnery training for Pacific Fleet carrier pilots, aviation technical training and parachute development and testing.

"We're Hauling 20-Ton Loads in New Jersey's Heavy Traffic— and Getting 7 MPG!"

— says Anthony Ferrante of Somerset Crushed Stone, Bernardsville, N. J.,
in reporting on his 25 GMC trucks



WHILE CLOCKING 50,000 TOUGH MILES A YEAR—in a punishing combination of on-and-off-the-road work—Somerset's GMC W635's turn in amazingly low operating figures. Down-time has been considerably less than the other-make trucks in the fleet, Truck Manager George West reports. And the new GMC rear ends have given, them *exceptionally satisfactory* service. Yet these GMC's aren't pampered. In fact, each rig puts in two years of hard work before it gets even a carbon and valve job.



POWER TO ZOOM 14-YARD LOADS UP OUT OF THE PIT FAST comes from GMC's big 225-hp "503" engine. And once on the highway, that quick-stepping power helps cut trip-time—make more trips during normal working hours. What's more, Somerset is getting this standout GMC performance on an amazing 7 mpg — even though they travel some of the busiest New Jersey highways. That's a full mpg better than comparable trucks doing the same job.



"THOSE GMC'S ARE NO. 1 IN OUR FLEET," says Somerset owner, Anthony Ferrante. His reason: Simply that the GMC's cost less to operate—so they make more money. Result: They have 6 more new GMC W635 tandems on order as this is written!

GMC TRUCK & COACH

A General Motors Division

Eliminated!

One Headache For This Piling Contractor

Driving steel-sheet piling through silty material softened by heavy rains—he had to work in a narrow, twisting, busy street with no space for job-site storage, and as always, a heavy cost penalty for time lost. By renting his piling from L. B. Foster Co., he got deliveries as needed—delivered by Foster trucks over planned routes. All the headaches that could have been the contractor's were eliminated by using Foster's Piling Rental Plan.

Foster Piling Rental Plans are complete—for all types of steel-sheet piling (and lightweight piling). You get the right type, the exact section, the exact length . . . when you need it . . . and at low fixed cost. Ask your nearest Foster office for details and prices—see for yourself the savings in Foster's Piling Rental Plan.

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DEATHS

Franklin J. Fullmer, 73, a co-founder of the contracting firm of Fullmer Brothers, Salt Lake City, Utah, who retired from the firm five years ago, died recently.

* * *

Herbert H. Wessel, 53, Arizona Highway Department's engineer of plans, died recently after a short illness. He was an employee of the highway department for more than 25 years.

* * *

De Marcus Forgey, veteran highway engineer with the Washington Department of Highways, died recently after a brief illness. His last assignment before his retirement from the state was as a district highway engineer in Seattle.

* * *

Raymond J. Huff, 63, vice president of Puget Sound Bridge & Dredging Co., died recently at his home in Seattle, Wash.

* * *

Howard F. Bell, 71, civil engineer, died in Cody, Wyo., recently. Prior to his retirement in 1950 he was City Engineer of Cody and County Engineer of Park County. A life member of the American Society of Civil Engineers, he had at one time served as president of the Wyoming Society of Engineers.

* * *

Thomas R. Simpson, 60, consulting engineer of Oakland, Calif., died recently after a prolonged illness. An

outstanding authority on water resources, he left his position with the California State Division of Water Resources in 1950 to accept an appointment as professor of irrigation engineering at the University of California, Berkeley.

* * *

Stephen M. Griffith, 75, head of the construction firm that built Shasta Dam and other huge projects, died recently of a heart attack. His Griffith Co. built dams and freeways throughout the West and also built portions of the Colorado River Aqueduct.

* * *

William S. Morrison, partner in California Gunite Co., Los Angeles, died recently of a heart attack. He was prominent in Gunite work in Southern California for more than 15 years.

* * *

Vaughn Wood, 68, Southern California civil engineer, died recently at his home in South Pasadena. Wood served with Los Angeles City and County from 1910 to 1917, later serving other Southland communities. His last public office was Road Commissioner of Imperial County, which he held from 1947 to 1951.

* * *

John H. Gardiner, 61, District Engineer for surface water investigations of the Geological Survey in Arizona, died recently in Tucson. Gardiner was a former president of two sections of the American Society of Civil Engineers.

* * *

George M. Leatherwood, 51, California State Highway Department engineer, recently died at Los Angeles.

Large contract awards in the West

ARIZONA

A low bid of \$567,638 was submitted by Mohamed Earthmoving Contractor of Phoenix for grading, surfacing and construction of a 2-span steel underpass structure and other work in Maricopa County. Copper State Construction Co. of Mesa submitted a low bid of \$355,555 for grading and surfacing 5½ mi. in Cochise County. A low bid of \$318,190 was submitted by Givens Construction Co. of Phoenix for grading, draining and surfacing 7.5 mi. of the Holbrook-St. Johns Highway in Apache County. L. M. White Contracting Co., Tucson, submitted a low bid of \$266,695 for grading and surfacing the Ft. Huachuca-Bisbee Highway in Cochise County. Isbell Construction Co. of Phoenix submitted a low bid of \$237,995 for grading and surfacing the Holbrook-Lupton Highway in Apache County. A

low bid of \$260,976 was submitted by Flickinger Bros. of Phoenix for 2.7 mi. of grading and surfacing the access road to aircraft plant in Pima. W. J. Henson of Prescott submitted a low bid of \$119,802 for grading and surfacing in Graham County.

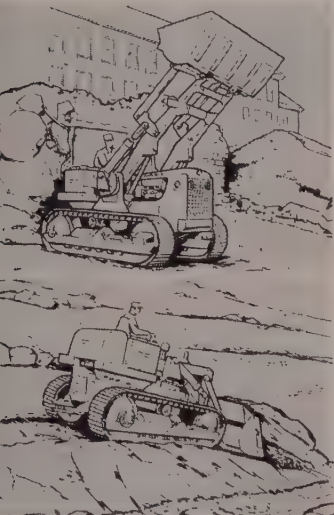
CALIFORNIA

A low bid of \$6,179,639 was submitted by Mittry Construction Co. of Los Angeles for Vaquero Dam and access road, Santa Maria Project. Charles MacClosky Co. and Crowell & Larson, Gardena, submitted a low bid of \$3,236,026 for 2.8 mi. of grading, surfacing and bridge construction in San Bernardino County. Clyde W. Wood & Sons, Inc., North Hollywood received a \$1,462,710 contract for Los Angeles River improvement, Atlantic Ave. to 63rd St., North Long Beach. Barrett Construction Co. of San Francisco submitted a low bid of \$1,400,256 for construction of Sheriffs

Cut Costs on MANY jobs with this ONE machine

The heavy-duty Allis-Chalmers 1½-yd HD-6G tractor shovel cuts costs while speeding many phases of construction — from clearing away old buildings and preparing raw land to leveling and landscaping.

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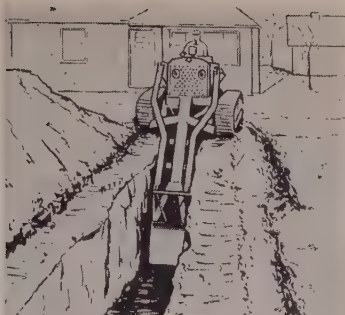
Clears and Loads Rubble

— Allis-Chalmers tractor shovels help demolish structures and load debris into trucks to prepare areas for new building.

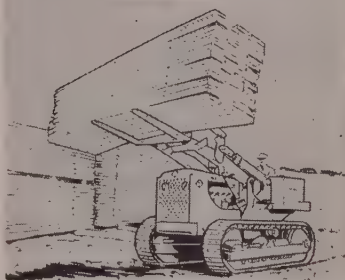
Prepares Raw Land

An HD-6G with standard bucket or bulldozer blade clears brush and trees, levels, moves big rocks, fills gullies — converts raw land into desirable tracts.

Excavates Basements with sides so straight and bottoms so level little handwork is required. Works in any weather. Ripper on rear of tractor increases digging efficiency up to one-third in any kind of soil.

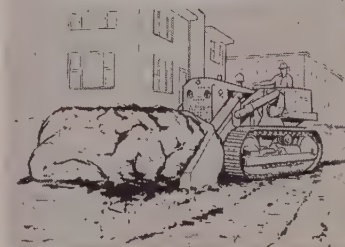


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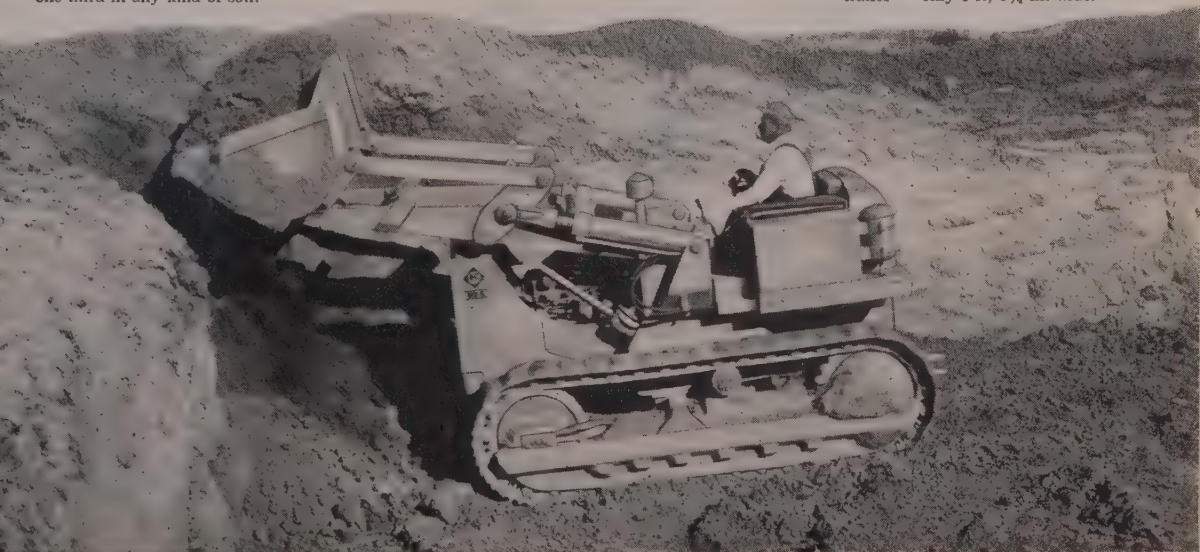
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Offices and County Jail in San Jose, Santa Clara County. A \$1,850,584 award was received by **T. M. Page Corp.** and **R. C. R. Corp.** of Monrovia for construction of San Antonio and Chico Creek Channels, Santa Ana River Basin, Los Angeles County. A \$2,818,146 contract was awarded to **Guy F. Atkinson Co.**, South San Francisco for grading, surfacing and construction of five bridges in Sonoma County. **Fredrickson & Watson Construction Co.** of Oakland received a \$995,555 contract for 1.6 mi. of grading, surfacing and construction of two bridges and a pumping plant in Colusa County. A low bid of \$4,893,086 was submitted by **Vinnell Co., Inc.** and **Vinnell Construction Co.** of Alhambra for 2.6 mi. of grading, surfacing and construction of nine bridges and seven retaining walls in Los Angeles County. **Humboldt Constructors, Inc.**, Eureka, submitted a low bid of \$820,952 for construction of two bridges in Mendocino County. **L. C. Anderson Co.** and **Oliver Construction Co.** of San Diego received a \$1,652,034 contract for construction of Naval Facility and Project Aircraft Maintenance Building, San Nicholas Island.

COLORADO

A low bid of \$544,788 was submitted by **Pioneer Construction Co.** of Pueblo for grading, surfacing and

structures in Adams and Arapahoe counties. **Lowdermilk Bros.**, Englewood, submitted a low bid of \$786,912 for grading and structures in Montrose County. **Peter Kiewit Sons' Co.** of Denver submitted a low bid of \$171,698 for street improvement, City and County of Denver. A \$409,000 award was received by **J. P. Elliott & Co.** of Pueblo for 3.3 mi. of grading and surfacing in San Isabel National Forest, Custer County. **C. L. Hubner Co.**, Denver, submitted a low bid of \$532,252 for Railroad and Highway Overpasses and paving in Denver and Arapahoe counties. **McMillon Construction Co.**, Englewood, submitted a low bid of \$277,809 for 2.9 mi. of grading, surfacing and structure in Gunnison County. A low bid of \$146,787 was submitted by **Western Paving Construction Co.** of Denver for street improvement, City and County of Denver. **Hunt Construction Co.** of Steamboat Springs submitted a low bid of \$228,701 for grading, surfacing and structures south of Iola in Gunnison County. A low bid of \$151,174 was submitted by **The Brannan Sand & Gravel Co.**, Denver, for street improvement in the City and County of Denver. **J. B. Kenney Inc.** of Denver submitted a low bid of \$92,200 for construction of the California St. Bridge, Denver County. **Pioneer Construction Co.** of Pueblo submitted a low bid of \$264,451 for grading, surfacing and structures in Lincoln County. **Peter Kiewit Sons'**

Co., Denver, submitted a low bid of \$319,052 for 2.8 mi. of grading, surfacing and structures in Moffat County.

IDAHO

A \$353,537 award was made to **Jack B. Parson Construction Co.** of Smithfield, Utah, for grading and surfacing 9.4 mi. of State Highway in Franklin County. **J. F. Konen Construction Co.**, Lewiston, received a \$216,939 award for grading and surfacing 16 mi. of highway in Lewis County. **Duffy Reed Construction Co.**, Twin Falls, received a \$627,306 award for 4.4 mi. of grading and surfacing from the Lewiston Dam East, in Nez Perce County. **Teller Construction Co.**, Portland, Oregon, received a \$232,600 contract for construction of CPP Maintenance Building in the CPP Area at the National Reactor Testing Station. **J. O. Young & Sons**, Nampa, received a \$157,844 award for construction of a bridge on State Highway 25, Jerome County. **Golden Wadsworth and W. E. Arrington**, Idaho Falls, received a \$208,384 contract for construction of utilities, services and roadways for the OMRE Area at the National Reactor Testing Station. **J. F. Konen Construction Co.**, Lewiston, received a \$120,588 award for 7.3 mi. of grading and surfacing in Idaho County. **Nelson & Deppe** of Boise received a \$94,819 contract for grading and surfacing in Blaine County. **F. H. DeAtley & Co.** of Lewiston received a \$73,700 award for grading and surfacing in Idaho County.

MONTANA

A \$383,679 contract was awarded **Sather & Sons of Yardley, Wash.**, for 7.3 mi. of grading and gravel surfacing the Kalispell-Whitefish Highway in Flathead County. **S. Birch Inc.** and **S. Birch & Sons**, Great Falls, submitted a low bid of \$620,886 for 10.4 mi. of grading and surfacing the Lewistown-Roy Highway in Fergus County. A \$113,795 contract was received by **Holm Construction Co.** of Glendive for construction of two bridges in Daniels County. **Walter Makin & Son**, Billings, received a \$120,837 award for construction of one bridge on the Fairview Highway in McCone County. **Virgil Smith** of Miles City received a \$207,671 contract for 5.4 mi. of grading and surfacing the Van Norman-Glasgow Highway in McCone County. **Charles Shannon** of Butte received a \$63,365 contract for grading, graveling and oiling the Butte-Walkerville Loop Highway in Silver Bow County.

NEVADA

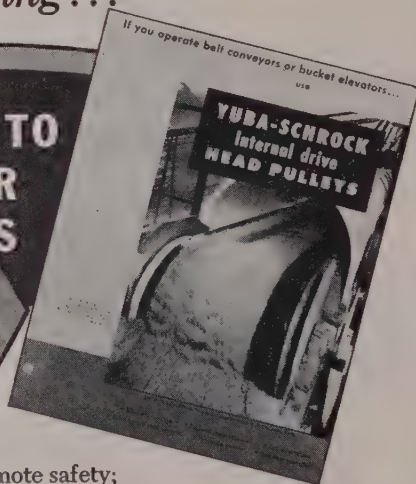
A \$364,592 contract was received by **Gibbons & Reed Co.** of Salt Lake City, Utah, for construction of a portion of State Highway System in Eu-

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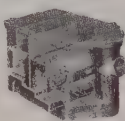
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reka and Elko counties. **J. C. Compton Co.**, McMinnville, Oregon, received a \$201,855 contract for grading and surfacing in Washoe County. **Hoops Construction Co.**, Twin Falls, Idaho, received an \$83,547 award for construction of a portion of highway in White Pine, Eureka County. **W. W. Simpson, General Contractors Co.**, Las Vegas, received a \$62,031 award for construction of a portion of the highway in Clark County. A \$488,771 contract was received by **Wells-Stewart Construction Co., Inc.**, of Las Vegas for 14.6 m. of grading and surfacing in Elko County. **Young & Smith Construction Co.**, Salt Lake City, Utah, received a \$423,800 contract for 17 mi. of grading and surfacing in Mineral and Church counties.

NEW MEXICO

A \$515,829 award was received by **Brown Contracting Co.** of Albuquerque for 9.4 mi. of grading and surfacing in Rio Arriba County. **E. M. Silver** of Albuquerque received a \$357,172 contract for 2.2 mi. of grading and surfacing in Rio Arriba County. A \$300,912 contract was received by **Allison & Haney**, Albuquerque, for 9.5 mi. of grading and surfacing in Valencia County. **G. I. Martin, O. D. Cowart and E. M. Silver** of Albuquerque received a \$572,160 contract for 6.5 mi. of grading and surfacing in Torrance County. A \$688,778 contract was received by **O. D. Cowart** of Albuquerque for 7.3 mi. of grading and surfacing in Valencia County. **Haake Construction Co., Inc.**, of Santa Fe received a \$138,184 award for 10.6 mi. of grading and surfacing in De Baca County.

OREGON

A low bid of \$381,365 was submitted by **Rogers Construction Co.**, Portland, for grading and paving the Pendleton-John Day Highway in Umatilla County. **Coos Bay Dredging Co.**, Coos Bay, submitted a low bid of \$236,735 for grading and paving the Coos River Highway in Coos County. **P. S. Lord Mechanical Contractors** of Portland submitted a low bid of \$152,630 for construction of a bridge, grading and stone base on the Fishhawk Falls Highway in Clatsop County. A low bid of \$125,365 was submitted by **McWaters Construction Co.** of Boise, Idaho, for construction of a guard rail and snow fence on the Old Oregon Trail, Malheur County. **Don Greene and Greene & Buick, Inc.**, of Salem submitted a low bid of \$119,228 for grading and oiling in Lincoln County. A low bid of \$122,538 was submitted by **Babler Bros., Inc.**, of Portland for stone base and oiling the Lakeview-Burns Highway in Harney County. **J. Ira McNutt Construction Co.** of Springfield submitted a low bid of \$239,248 for grading and paving the Elkton-Suth-

erlin Highway in Douglas County. A low bid of \$206,566 was submitted by **Warren Northwest, Inc.**, of Portland for grading and paving the Oregon Coast Highway in Curry County. **Tom Lillebo** of Reedsport submitted a low bid of \$107,240 for bridge construction, grading and oiling the Independence-Albany Highway in Polk County. **Elite Construction** of Boring submitted a low bid of \$414,292 for construction of stone revetment, apron and a drift barrier along the bank of the Willamette River.

UTAH

A low bid of \$329,395 was submitted by **Germer, Abbott & Waldron** of Tremonton for 25.5 mi. of grading and surfacing in San Juan County. A \$378,909 contract was received by **Gibbons & Reed** of Salt Lake City for 2 mi. of grading, surfacing and construction of one bridge in Salt Lake County. **Sorensen Construction Co.** of Murray submitted a low bid of \$89,953 for 3.4 mi. of grading and surfacing in Tooele County. **LeGrand Johnson Construction Co., Inc.**, of Logan submitted a low bid on two contracts: \$301,707 for 10.2 mi. of grading and surfacing in Rich County and \$141,076 for 5.9 mi. of grading and surfacing in Cache County. **Thorn Construction Co.** of Springville received a \$175,000 award for 9.2 mi. of grading and surfacing in Wasatch National Forest, Summit Wasatch and Duchesne counties. A \$160,000 contract was received by **R. M. Jensen** of Salt Lake City for 4.3 mi. of grading and surfacing in Wasatch National Forest, Summit County. A \$163,000 contract was received by **Gregerson & Jensen** of Gunnison for 9.9 mi. of grading and surfacing in Grand County.

WASHINGTON

A \$1,000,000 contract was awarded to **Henry George & Sons** of Spokane for construction of a pea processing plant and feed mill in Spokane. A \$926,659 contract was awarded to **Fiorito Bros.** of Seattle for clearing, drainage, grading, rein-con. slab bridge and lighting system, Hwy. 1, Desota St. to Capitol Lake Bridge in Thurston County. **United States Steel Corp.**, Pittsburgh, Pa., was awarded a \$1,596,152 contract for the superstructure of the Maple St. Bridge in Spokane County. **Morrison-Knudsen Co., Inc.** and **Rumsey & Co.** of Seattle was awarded a \$2,826,615 contract for bridge construction in Seattle, King County. **Cherf Brothers, Inc.**, and **Sandkay Contractors, Inc.**, of Ephrata submitted a low bid of \$293,371 for earthwork and structures, East Low Canal Wasteways, Columbia Basin Project. **Associated Sand & Gravel Co.** of Everett was awarded a \$231,388 contract for

7 mi. of grading and surfacing in Mount Vernon, Skagit County. **United Paving Co.**, Spokane, was awarded a \$179,243 contract for 17.1 mi. of grading and surfacing in Okanogan and Douglas counties. **Warren Northwest Inc.**, Portland, Oregon, was awarded a \$176,034 contract for 6.7 mi. of grading and surfacing in Wahiakum County.

WYOMING

A low bid of \$687,114 was submitted by **Read Construction Co.** of Cheyenne for grading, draining, paving and bridge construction on Main Street in the city of Riverton, Fremont County. **Big Horn Construction Co.** of Sheridan received two contracts for highway construction work: \$178,085 for 9.1 mi. of misc. work on the Afton Border road in Lincoln County and \$148,991 for grading, draining and surfacing in Sheridan County. **Rissler & McMurrey Co., Inc.**, of Casper received a \$160,733 contract for grading and surfacing 4.7 mi. of the Hams Fork road in Lincoln County. **W. E. Barling, Inc.**, of Meeteetse received a \$204,353 award for grading and surfacing in Lincoln County. **Black Hills Construction Co.**, Oklahoma City, Okla., submitted a low bid of \$393,700 for construction of the access road tunnel, Glendo Unit, Missouri River Basin Project.

ALASKA

A \$3,679,829 contract award was received by **S. Patti MacDonald Construction Co.** and **MacDonald Inter-American Corp.** of St. Louis, Mo., for construction of a White Alice facility and aircraft control warning station for the Air Force at Unalakleet. **North-ern Corp.** of Anchorage received a \$1,360,979 contract for construction of White Alice facilities for the U. S. Air Force at Sparrevohn. **Pacific Alaska Contractors, Inc.**, of Anchorage submitted a low bid of \$854,873 for the 11 schedules for paving and other work at Fort Richardson and a fire and evacuation alarm system at adjoining Elmendorf Air Force Base. A low bid of \$554,400 was submitted by **Chris Berg** of Seattle for schedule A, construction of a maintenance shop and heated vehicle storage at the Eielson Air Force Base. A low bid of \$2,249,855 was submitted by **Lease Co., Inc.**, of Anchorage for construction of a hangar, NCO open mess, standby wells and building improvements at Fort Richardson, and a proposed TACAN facility at Elmendorf Air Force Base. **S. Patti-MacDonald Construction Co.** of St. Louis, Mo., submitted a low bid of \$2,929,212 for construction of terminal fuel storage facilities and other work at Fort Richardson. **Morrison-Knudsen**, Anchorage, was awarded at \$1,303,269 contract for construction of apron paving, Ladd Air Force Base.

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UNIT PRICES

Selected abstracts for Western projects

HIGHWAY—Construction of 2.179 mi. highway in New Mexico

New Mexico—Catron County—Bureau of Public Roads. Brown Construction Co. submitted a low bid of \$185,830 for about 2.2 mi. of highway to be graded and paved on U.S. 21 in New Mexico.

(1) Brown Construction Co.	\$185,830		
(2) Wayne A. Lowdermilk, Inc.	192,173		
Floyd Haake	201,700		
G. I. Martin	203,533		
	(1)	(2)	
Lump Sum	Clearing and grubbing	\$2,000.00	\$7,500.00
172,000 cu. yd.	Unclassified excavation	.48	.42
750 cu. yd.	Uncl. excav. for structures	1.50	4.50
6,000 cu. yd.	Uncl. excav. for Borrow, Case 1	.30	.40
240,000 sta. yd.	Overhaul (1,000 ft. free haul)	.02	.02
2,000 cu. yd. mi.	Special overhaul of Borrow (1,000 ft. free haul)	.40	.30
Contingent Sum	Obiteration of old roadways	1,000.00	C.S.
3,000 unit	Watering of embankment	1.70	.50
230 unit	Watering of base course	1.70	.50
Lump Sum	Prov. & maint. water plant or plants	1,000.00	6,500.00
750 hr.	Rolling of embankment	8.00	8.00
80 hr.	Rolling of base course	7.00	8.00
9,400 ton	Subbase material	85	.70
42,400 sq. yd.	Cr. gravel or cr. stone base course	1.00	.95
48,000 gal.	Processing bituminized base	.10	.125
5,000 gal.	MC cutback asphalt, gr. 0, 1, 2, or 3	.22	.18
298 cu. yd.	RC cutback asphalt, gr. 1 or 2	.21	.20
27,200 lb.	Concrete Class "A"	56.00	65.00
1,206 lin. ft.	Reinforcing steel	.15	.18
194 lin. ft.	24-inch CGSM culvert pipe	7.00	8.00
338 lin. ft.	36-inch CGSM culvert pipe	12.00	12.00
4 ea.	48-inch CGSM culvert pipe	17.00	19.50
6 ea.	24-inch metal pipe end sections	50.00	50.00
4 ea.	36-inch metal pipe end sections	100.00	95.00
15 ea.	48-inch metal pipe end sections	200.00	190.00
1 ea.	Concrete maintenance marker posts	20.00	20.00
5,200 lin. ft.	Cattle guard (30 foot)	3,000.00	4,500.00
140 ea.	Move and rebuild forest service strips (tr.)	.20	1.00
5,300 lin. ft.	Timb. guide posts w/refl. strips (tr.)	7.00	7.00
	Rem. & reb. forest service tele. line	.50	.25

HIGHWAY—Roadwork at Riverton, Wyoming

Wyoming—Riverton County—State. Read Construction Co. submitted a low bid of \$687,114 for miscellaneous roadwork and construction of frame bridge over Wyoming Canal in Riverton County.

(1) Read Construction Co.	\$687,114		
(2) Inland Construction Co.	701,682		
Kniesly Moore Co.	703,195		
Taggart Construction Co.	703,927		
	(1)	(2)	
65,000 cu. yd.	Excavation	\$.87	\$.75
17,900 cu. yd. mi.	Cubic yard mile haul	.24	.20
1,950 M. gal.	Watering	2.60	3.00
140 hr.	Sheep's foot roller operation	14.00	16.00
370 hr.	Pneumatic tured roller operation	8.00	7.00
40 hr.	Smooth steel roller operation	11.00	9.00
4,800 cu. yd.	Special embankment (emb. cu. yd.)	.53	.83
	Crushed grav. base course (2 in. max.)		
31,600 ton	Grading A	.71	.80
23,700 ton	Crushed grav. base course (1 in. max.)	.85	1.00
15,200 ton	Plant mixed surface course	4.35	5.00
1,010 ton	Crushed sand-gravel	4.00	3.00
158,900 ton mi.	Haul of surfacing material	.25	.13
207 ton	Asphaltic material MC-prime	39.00	35.00
955 ton	Asphaltic material AC (85-100)	35.00	31.00
22 ton	Asphaltic material RC-tack coat	60.00	50.00
95 ton	Asphaltic material RCF-seal	45.00	47.00
4,892 lin. ft.	12 in. std. R.C.P.	3.00	4.00
2,972 lin. ft.	18 in. std. R.C.P.	6.00	6.00
2,640 lin. ft.	24 in. std. R.C.P.	9.00	9.00
1,138 lin. ft.	30 in. std. R.C.P.	12.00	12.00
350 lin. ft.	36 in. std. R.C.P.	15.00	16.00
3,190 lin. ft.	48 in. std. R.C.P.	25.00	28.00
40 lin. ft.	18 in. extra strength R.C.P.	6.50	7.00
1,180 lin. ft.	12 in. C.M.P.	3.70	3.00
998 lin. ft.	18 in. C.M.P.	5.00	4.00
228 lin. ft.	24 in. C.M.P.	7.00	7.00
632 lin. ft.	22 in. x 13 in. C.M.P. arch culverts	5.00	5.00
80 lin. ft.	43 in. x 27 in. C.M.P. arch culverts	15.00	14.00
263 lin. ft.	Relaying pipe	3.00	4.00
66 ea.	12 in. C.M.P. flared end section	23.00	23.00
31 ea.	18 in. C.M.P. flared end section	33.00	35.00
5 ea.	24 in. C.M.P. flared end section	46.00	54.00
18 ea.	22 in. x 13 in. C.M.P. arch flared end section	27.00	33.00
2 ea.	43 in. x 27 in. C.M.P. arch flared end section	91.00	100.00

85.0 lin. ft.	18 in. bit. coated siphon C.M.P.	13.00	15.00
85.0 lin. ft.	24 in. bit. coated siphon C.M.P.	17.00	20.00
12.5 lin. ft.	4 in. metal drain pipe	25.00	5.00
80 ea.	Drop inlet—Type "A"	200.00	140.00
2 ea.	Drop inlet—Type "C"	290.00	160.00
10 ea.	Drop inlet—Type "D"	330.00	220.00
9 ea.	Manholes—Type "C"	350.00	375.00
2 ea.	Manholes—Type "L"	500.00	500.00
25 ea.	Adjusting manholes	50.00	46.00
22,600 lin. ft.	Combined curb & gutter—Type "A" (2 ft.-6 in.)	2.25	3.00
530 sq. yd.	Concrete double gutters	6.00	6.00
18,900 lin. ft.	Curb—Type "A" (12½ in.)	1.60	1.32
5,530 sq. yd.	Concrete median paving	3.30	4.00
300 sq. yd.	Concrete sidewalk	3.90	5.00
6,260 sq. yd.	Removing concrete slab	1.25	1.20
60 cu. yd.	Class 1 riprap	16.00	13.00
70 cu. yd.	Grouted rubble paving	24.00	21.00
550 sq. yd.	Class B concrete	5.00	8.00
312.3 cu. yd.	Class C concrete	55.00	55.00
50.6 cu. yd.	Reinforcing steel	45.00	45.00
60,280 lb.	Structural steel	.18	.18
4,730 lb.	Wet excavation for bridges	.67	.67
330 cu. yd.	Dry excavation for bridges	5.25	5.25
120 cu. yd.	Excavation for pipe culverts	4.00	4.00
375 cu. yd.	Structure excavation	4.00	4.00
240 cu. yd.	Sewer excavation	1.20	1.85
14,200 cu. yd.	Mechanical tamping	8.00	8.00
3,165 hr.	Barbed wire fence (4 wire)	.20	.22
5,900 lin. ft.	Barbed wire fence (7 wire)	.24	.28
900 lin. ft.	32 in. woven & 2 barbed wire fence	.32	.30
1,050 lin. ft.	48 in. woven wire fence	.35	.45
650 lin. ft.	Resetting R/W fence	.18	.40
520 lin. ft.	Brace panels	13.00	17.00
20 ea.	End panels	15.00	20.00
40 ea.	Reset cattleguard	200.00	200.00
1 ea.	Patrol operation	11.00	12.00
20 hr.	R/W markers	11.00	13.00
20 ea.	R. C. project markers	40.00	26.00
4 ea.	Removing existing structures	2,800.00	2,800.00
Lump Sum			

HIGHWAY—Grading and paving in Nevada

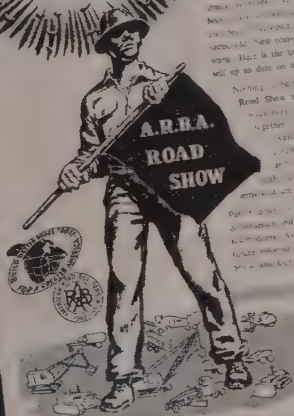
Nevada—Churchill County—State. Dodge Construction Inc., received a \$166,917 contract for construction of 1.8 mi. of highway near Fallon, Nev.

(1) Dodge Construction, Inc.	\$166,917		
(2) Silver State Construction Co.	174,403		
Isbell Construction Co.	191,403		
	(1)	(2)	
Lump Sum	Signs	\$1,500.00	\$500.00
8,727 lin. ft.	Remove fence	.10	.10
1 ea.	Remove timber bridge	200.00	2,000.00
30 lin. ft.	Remove culvert pipe	1.50	3.00
2 ea.	Remove timber box culverts	100.00	100.00
7,472 cu. yd.	Roadway excavation	.30	.30
80 cu. yd.	Drainage excavation	1.00	.30
23,461 cu. yd.	Borrow	.30	.24
86,684 yd. sta.	Overhaul yd. sta.	.02	.02
983 yd. mi.	Overhaul yd. mile	.20	.25
700 cu. yd.	Structure excavation	3.00	3.00
830 cu. yd.	Backfill	2.00	1.50
1,560 M. gal.	Water	1.00	1.00
Lump Sum	Furnish water equipment	1,500.00	1,000.00
21 hr.	Power roller	7.50	7.00
1,190 ft. hr.	Tamping or pneumatic-tired roller	.75	.50
5,922 ton	Type 1 gravel base	1.65	1.30
10,578 ton	Gravel surface	1.75	1.40
16 ton	Liquid asphalt, Type MC-2	50.00	40.00
195 ton	Liquid asphalt, Type SC-4	34.00	34.00
1.85 mi.	Roadmix	800.00	1,000.00
2,228 sq. yd.	Roadmix intersections	.30	.10
565 cu. yd.	Class AA concrete	65.00	80.00
121 cu. yd.	Class AA concrete (piles)	32.50	100.00
24 cu. yd.	Class AA concrete (slope pavement)	50.00	60.00
134,400 lb.	Reinforcing steel	.14	.14
234 sq. yd.	Mesh reinforcement	.50	.50
376 lin. ft.	Structural steel rail (Type B)	7.50	8.00
0.7 mfbm.	Timber	800.00	400.00
186 lin. ft.	24 in. corr. metal pipe (dipped)	6.50	6.00
148 lin. ft.	29 in.x18 in. corr. met. arch pipe (dipped)	9.00	8.00
86 lin. ft.	43 in.x27 in. corr. met. arch pipe (dipped)	15.50	13.00
126 lin. ft.	58 in.x36 in. corr. met. arch pipe (dipped)	21.00	20.00
68 ea.	Culvert markers and guide posts	.40	.40
12,201 lin. ft.	Construct Type B-4B fence	7.50	10.00
34 ea.	Reference monuments	6.00	6.00
40 ea.	Right-of-way markers	—	—
Lump Sum	Furnish pile driving equipment	4.35	5.00
3,920 lin. ft.	Furnish steel pile shells	1.00	1.50
3,920 lin. ft.	Drive steel pile shells	500.00	500.00
2 ea.	Load test	1.70	.50
1,144 lin. ft.	Fibre tubes	300.00	300.00
Force Account	Miscellaneous work		

**the most IMPORTANT PLACE
for the Construction Industry
in 1957**

A.R.B.A.
ROAD SHOW
and CONVENTION
PLAN NOW!

JAN 28
1957



PLAN NOW

Just planning with it the first Road Show is almost a done deal. The show's organizers have been in contact with the New England Sports Center in Boston, and the show is expected to be a big success. The show's organizers have been in contact with the New England Sports Center in Boston, and the show is expected to be a big success. The show's organizers have been in contact with the New England Sports Center in Boston, and the show is expected to be a big success.

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AMERICAN
ROAD BUILDERS
ASSOCIATION
World Center Building
Washington, D. C.

**A.R.B.A.
ROAD SHOW
and CONVENTION,
International Amphitheatre,
Jan. 28 to Feb. 2, 1957**

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World Center Building Washington 6, D. C.



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A. PLENTY ...
We're using 'em for two good reasons...

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Secondly, HyPOWER cylinders are production made --- in eleven types and over 300 diameters and strokes. That means a big saving to us over custom made cylinders.

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Points like HyPOWER'S heavier cylinder walls and shafts ... simple but accurate stroke controls ... all-welded construction without staybolts.

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TURLOCK, CALIFORNIA

HyPOWER

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BRIDGE—Construction of girder bridge and 0.4 mi. of roadway approach

California—Humboldt County—State. Peter Kiewit Sons' Co., Medford, Oregon, received an award of \$710,276 for the construction of bridge and roadway approach at Hoopa. Unit prices were as follows:

(1) Peter Kiewit Sons' Co.	\$710,276	
(2) Johnson, Drake & Piper, Inc.	712,107	
Pacific Bridge Co.	737,204	
Ben C. Gerwick, Inc.	742,979	

	(1)	(2)
Lump Sum	Removing timber bridge	\$3,000.00
Lump Sum	Removing truss span & concrete	\$5,400.00
700 sq. yd.	substructures	2,000.00
	Obliterating existing roadway	.20
	Clearing & grubbing	1,200.00
	Dev. wat. sup. & furn. wat. equip.	3,000.00
1,200 M. gal.	Applying water	3.00
14,700 cu. yd.	Roadway excavation	.60
1,710 cu. yd.	Structure excav. type "A"	6.00
665 cu. yd.	Structure excavation	4.00
655 cu. yd.	Structure backfill	2.50
100,000 ton	Imported borrow	.95
4,200 ton	Untreated base	2.80
12 ton	Liquid asphalt, SC-2 (pr. ct.)	115.00
3 ton	Liquid emulsion (sl. ct.)	135.00
75 ton	Liq. asph. SC-3 or SC-4 (R.M.S.)	40.00
1,700 ton	Mineral aggregate (R.M.S.)	2.65
11,500 sq. yd.	Mix. & comp. R.M.S.	.30
3.7 M.F.B.M.	Douglas fir timber	200.00
	Bridge deck	63,000.00
1,525 cu. yd.	Class "A" conc. (footing blocks)	23.00
1,334 lin. ft.	Class "A" (bridge) (920 cu. yd.)	56,271.00
	Conc. railing	8.00
900 lb.	Bar reinf. stl. (bridge) (215,000 lbs.)	32,000.00
4,000 sq. yd.	Bar reinf. steel	.16
144 lin. ft.	Mesh reinforcement	1.00
	Drilling & grouting dowels	10.00
13 ea.	Structural steel	284,350.00
1,300 sq. yd.	Clean. & paint. structural steel	18,000.00
700 cu. yd.	Right-of-way monuments	9.00
104 lin. ft.	Wire & rock mattress	4.50
51 ea.	Class "B" conc. (slope paving)	54.00
	Metal plate guard railing	5.00
2,300 lin. ft.	Guide posts, culvert markers & clear. markers	8.00
2 ea.	New property fence	.70
208 lin. ft.	16-ft. property fence gates	75.00
2 ea.	18" C.M.P. (16 gage)	4.00
5 ea.	Flared end sect. for 18" metal pipe	40.00
70 lin. ft.	Entrance tapers for 8" downdrains	45.00
	8" C.M.P.I downdrains	2.50
	Finishing roadway	1,000.00
70 hr.	Rolling of base course	10.00
220 ea.	Strips (treated), Type 1	7.00

HIGHWAY—2.6 mi. grading and surfacing

California—Marin County—State. John Delphia was awarded a \$270,106 contract for grading and surfacing near Fairfax, Calif. Unit prices were as follows:

(1) John Delphia	\$270,106	
(2) Close Building Supply, Inc.	297,804	
W. H. Darrough & Sons	299,875	
Frederickson Bros.	337,360	
Chas. L. Harney, Inc.	338,620	

	(1)	(2)
31 cu. yd.	Removing concrete	\$ 6.00
3,100 sq. yd.	Removing concrete pavement	.70
	Clearing & grubbing	15,000.00
	Dev. wat. sup. & furn. wat. equip.	4,000.00
4,170 M. gal.	Applying water	.90
133,400 cu. yd.	Roadway excavation	.66
3,100 cu. yd.	Structure excavation	2.00
1,900 cu. yd.	Structure backfill	6.00
2,300 cu. yd.	Ditch & channel excavation	1.10
10,500 sq. yd.	Compacting original ground	.04
4,490,000 sq. yd.	Overhaul	.003
25,000 cu. yd.	Processing selected material	.60
395 cu. yd.	Class "A" concrete (structures)	.13
43,700 lb.	Bar reinforcing steel	.42
160 cu. yd.	Right-of-way monuments	8.00
24 ea.	Broken concrete riprap	9.00
90 cu. yd.	New property fence	.50
28,000 lin. ft.	10-ft. new property fence gates	60.00
46 ea.	18 in. R.C.P. (standard strength)	5.00
270 lin. ft.	21 in. R.C.P. (standard strength)	6.00
180 lin. ft.	24 in. R.C.P. (standard strength)	7.00
320 lin. ft.	27 in. R.C.P. (standard strength)	8.20
90 lin. ft.	30 in. R.C.P. (standard strength)	14.00
100 lin. ft.	42 in. R.C.P. (standard strength)	18.00
130 lin. ft.	48 in. R.C.P. (standard strength)	22.00
60 lin. ft.	54 in. R.C.P. (standard strength)	25.00
190 lin. ft.	60 in. R.C.P. (standard strength)	29.00
290 lin. ft.	66 in. R.C.P. (standard strength)	3.00
78 lin. ft.	69 in. R.C.P. (standard strength)	3.00
430 lin. ft.	8 in. C.M.P. (16 gage)	3.00
600 lin. ft.	12 in. C.M.P. (16 gage)	4.00
26 lin. ft.	18 in. C.M.P. (16 gage)	6.00
38 lin. ft.	24 in. C.M.P. (14 gage)	2.00
5,850 lin. ft.	8 in. perf. metal pipe underdrains	8.00
1,460 ton	Filter material	1,500.00
	Finishing roadway	1,390.00

RIDGES—Construction of two welded plate girder bridges and approaches in California

California—Mendocino County—State. Humboldt Constructors, Inc., were awarded an \$820,952 contract for construction of two welded plate girder bridges and 0.7 mi. of roadway to be graded.

(1) Humboldt Constructors, Inc.	\$820,952
(2) C. K. Moseman	826,696
Erikson, Phillips & Weisberg	863,793
Chas. L. Harney, Inc.	892,155

	(1)	(2)
16 acre Clearing & grubbing	\$ 800.00	\$1,875.00
Dev. wat. sup. & furn. wat. equip.	10,000.00	10,000.00
3,300 M. gal. Applying water	2.00	2.00
90,000 cu. yd. Roadway excav.	.65	.50
1,600 cu. yd. Structure excav. (Type A)	10.00	15.00
4,100 cu. yd. Structure excav.	5.00	4.00
2,350 cu. yd. Structure backfill	3.00	4.00
450 cu. yd. Ditch & channel excav.	3.00	2.00
100,000 sta. yd. Overhaul	.01	.01
505 cu. yd. Class "A" conc. (footing blocks)	36.00	35.00
27 cu. yd. Class "A" conc. (structures)	100.00	100.00
Lump Sum Class "A" conc. (bridges) (3,610 cu. yd.)	252,000.00	263,000.00
1,814 lin. ft. Conc. railing	8.00	7.00
850 lin. ft. Rubber waterstops	3.00	2.00
1,300 lb. Bar reinf. steel	.20	.15
Lump Sum Bar reinf. steel (bridges) (513,000 lb.)	66,690.00	70,000.00
2,220 lin. ft. Furn. steel piling	4.00	4.00
86 ca. Driving steel piles	150.00	160.00
9 ca. Steel pile splices	40.00	30.00
Lump Sum Structural steel (1,025,000 lbs.)	190,700.00	190,000.00
Lump Sum Cleaning & painting structural steel	17,000.00	14,000.00
182 lin. ft. 18 in. C.M.P. (16 ga.)	5.00	4.00
270 lin. ft. 24 in. C.M.P. (14 ga.)	6.00	6.00
80 lin. ft. Furn. 30 in. asb. bonded paved invert C.M.P. (12 ga.)	14.00	15.00
80 lin. ft. Jacking 30 in. asb. bonded paved invert C.M.P.	20.00	20.00
1 ea. 18 in. x 12 in. C.M.P. reducer	50.00	55.00
1 ea. 24 in. x 18 in. C.M.P. reducer	75.00	65.00
286 lin. ft. 84 in. field assem. plate culv. (35-13)	60.00	65.00
250 lin. ft. 8 in. perforated metal pipe underdrains	2.00	2.10
2,150 cu. yd. Filter material	4.00	5.00
1 ea. Entrance taper for 8 in. metal pipe	20.00	35.00
40 lin. ft. 8 in. C.M.P. downdrains	2.00	3.00
140 lin. ft. 12 in. C.M.P. downdrains	3.00	4.00
1 ea. 18 in. C.M.P. downdrains	5.00	5.00
1 ea. 8 in. downdrain slip joint	20.00	35.00
1 ea. 12 in. downdrain slip joint	30.00	50.00
1 ea. 18 in. downdrain slip joint	40.00	60.00
Lump Sum Finishing roadway	2,500.00	2,000.00
1 ea. Redwood cover for drop inlet	175.00	25.00

HIGHWAY—Grading and paving in Oregon

Oregon—Umatilla—State. Rogers Construction Inc., submitted a low bid of \$381,365 for grading and paving in Oregon.

(1) Rogers Construction, Inc.	\$381,365
(2) Warren N. W., Inc.	422,440
J. N. Conley	426,574
C. R. O'Neil	446,182

	(1)	(2)
Lump Sum Clearing and grubbing	\$2,500.00	\$9,000.00
650 cu. yd. Drainage excavation, unclassified	2.00	2.00
224,000 cu. yd. General excavation, unclassified	.33	.52
710,000 yd. st. Short overhaul	.01	.01
17,000 C-y. s. Long overhaul	.30	.30
5.18 mi. Finishing roadbed and slopes	500.00	500.00
13,000 lin. ft. Rounding cutbanks	.10	.10
730 lin. ft. 12-inch concrete pipe	2.00	2.20
30 lin. ft. 18-inch concrete pipe	3.35	3.50
1,350 lin. ft. 30-inch concrete pipe	7.00	7.00
160 lin. ft. 36-inch concrete pipe	9.00	9.00
280 only Metal sight posts	2.50	2.50
500 lin. ft. Metal guard rail	3.00	2.50
59,000 cu. yd. Coarse crushed material in base	1.35	1.45
10,500 cu. yd. ¾ in.-0 material in base	1.35	1.65
1,750 M. gal. Sprinkling	2.00	2.25
5.18 mi. Preparation of base	100.00	150.00
900 cu. yd. ¾ in.-0 material in binder course	3.00	2.50
150 ton MC-2 asphalt in binder course	42.00	42.00
1,500 ton Asphaltic conc. mixture in patching	3.50	3.75
25,500 ton Asphaltic concrete mixture	3.50	3.25
1,620 ton 85-100 asphalt in mixture	34.00	34.00
40 ton RS-1 asphalt	45.00	50.00
50 only Extra for asph. concrete approaches	30.00	25.00
100 ton RS-2 asphalt	45.00	46.00
460 cu. yd. Aggregate in pavement seal	5.00	4.50

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then

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Lift Slab growth lifts a sharp curve

If a new method of building construction showed a volume increase of twenty times during the last five years compared to the preceding two years there would seem to be evidence that the new idea was securing acceptance. That has been the record of lift slab construction in square feet of slab lifted during the brief seven years of its history.

Regardless of the prejudice that any new construction idea must overcome, as well as the need to effect refinements in field procedure, the acceptance has been widespread. With the relatively short experience record it would be obvious that there will be further improvements. What new process does not need adjustments and suggestions from the firing line? Also, any form of building construction must find its most logical field of use. That has been true of older types of construction and certainly applies to new ones. Each must find a place where its particular advantages and merits are best suited within the broad field of building construction. Further, comparative costs figures are tricky things and it is prudent to have these established on the widest possible experience so that any savings will be larger than anticipated, rather than the sour reverse.

The fact remains that a new construction procedure has received a rather remarkable acceptance in a few short years. It takes its place with such modern developments as prestressing and slip forms. All concerned with concrete design and construction should become thoroughly familiar with its principles and procedures, if for no other reason than to be informed on methods that are new. There will be those who will be slow to accept it; they treat all innovations with suspicion. However, it must be remembered that any type of design that has remained unchanged for, say, twenty years, should also be treated with suspicion as having served its usefulness. Engineering and construction are advancing at a fast rate.

"What" and "How"—Chapter 2

A couple of months ago some thoughts were expressed in this column on the fact that engineers are responsible for the results to be accomplished while contractors are concerned with methods of getting the work done. The statement was somewhat over-simplified and was intended to present a broad principle. Obviously, it is not all black or white; there are many shades of gray. Comments from various sources have reached us pointing out these variations, and cause a further word of comment.

The premise remains correct. Stated in simplest terms it is the concern of the engineer to obtain results that are strictly in accord with his designs and specifications, while the contractor has the responsibility of getting the prescribed work done at a minimum of cost and time.

The main argument against having the engineer specify "How" to the contractor is the restriction it places on introducing new types of machines or new methods of procedure. But here, again, a general rule needs to be properly applied.

Two illustrations of leaving the "How" up to the contractor show the opportunity for opening the door to progress. In the simple case of securing a desired degree of compaction in an earthfill, a specification that states result to be accomplished allows for the introduction of new types and sizes of machines and methods of use that can represent progress. In fact, if the other idea was carried to extreme and the "How" was prescribed without allowing the opportunity to try new ideas, it would represent a definite brake on construction progress. Again, suppose a designer not too familiar with the fast-moving developments in the field of welding was to specify in detail a procedure with which he had long been familiar. He might be ruling out a newer method that could produce better results, and faster.

On the other hand there are cases where the engineer is forced to spell out field methods in detail. Such cases may involve translating a new design from laboratory tests to the field. In such a case the engineer must insist on procedures that follow methods proven by the tests, rather than permit innovations. Or, take a peculiar situation where contractors too long familiar with local specifications know ways of introducing procedures that "get by," but are undesirable. In such cases the engineer is forced to write in the exact procedure to secure the design requirements.

So, there are shades of gray between the black and white generalization. The fact remains that the engineer has the responsibility for the "What" and the contractor tries his best to work out the logical and low-cost "How." If both could have a fuller appreciation of the other's objective and problems it would be an advantage to the progress of construction.

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