WESTERN CONSTRUCTION

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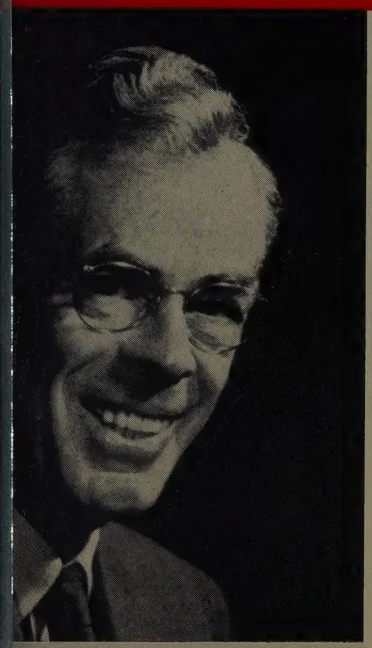

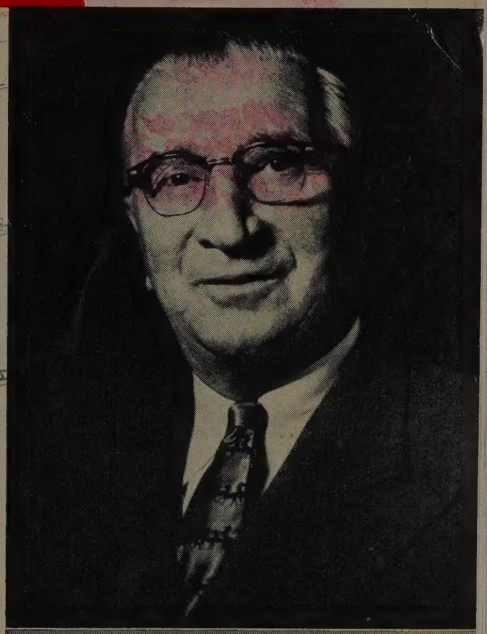

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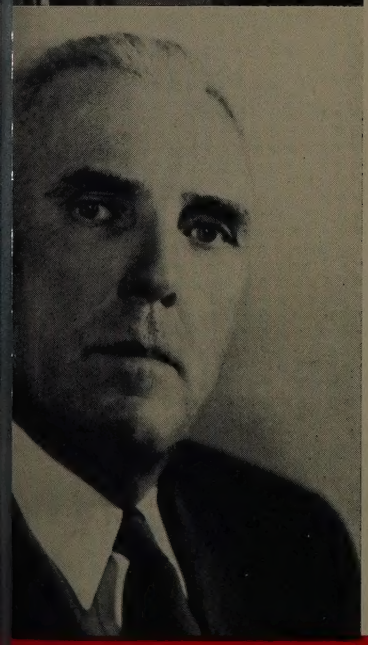
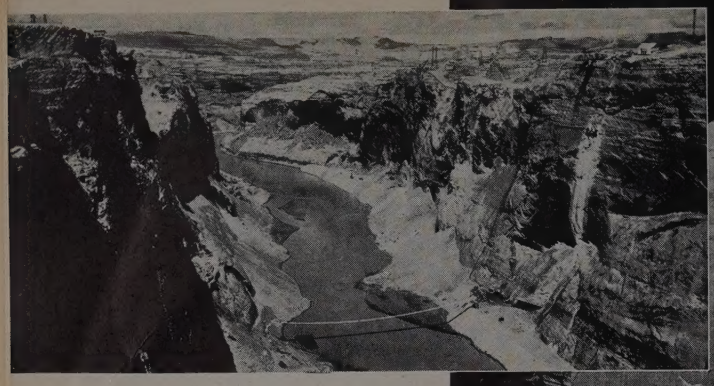
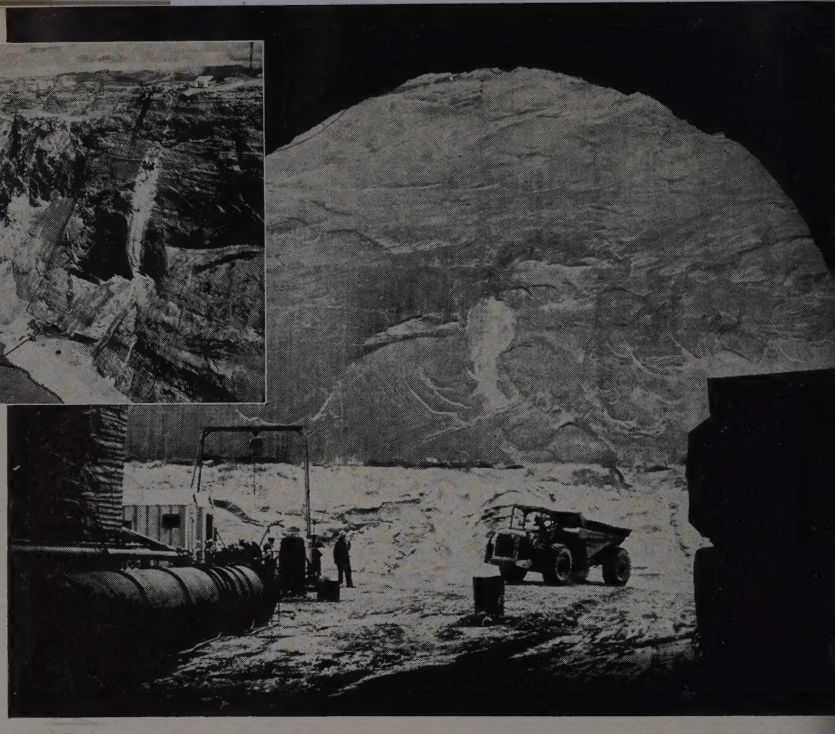
Carleton • McCormick



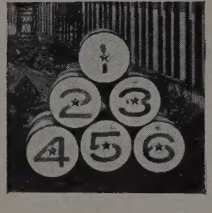
FEBRUARY 1959





SECOND LARGEST DAM IN THE U.S., at Glen Canyon, Ariz., will incorporate two of these 2,800 ft. diversion tunnels. Frazier-Davis equipment runs dependably, stays on the job, thanks to the Texaco Simplified Lubrication Plan.

Glen Canyon tunnel borings nearing completion with Texaco Plan



Only 6 lubes needed to keep Frazier-Davis equipment working dependably

This is Frazier-Davis Construction Company's job: to bore the east side diversion and service tunnels, with a combined length of 2½ miles, through the walls of Arizona's Glen Canyon. It's a vital project, part of the Bureau of Reclamation's $760 million development of 10,000 square miles of arid land. On a job as big as the Glen Canyon Dam, on-time completion of every phase is absolutely essential. And that puts a priority on dependable equipment performance.

The Texaco Plan keeps equipment on the job—at lowest cost—by handling all major lubricating problems with no more than six products. A combination of specialized and multi-purpose lubricants assures proper lubrication for each machine, with lower lubricant inventory and less chance for mistakes. For Frazier-Davis, the Texaco Simplified Lubrication Plan has proved to be one of the most economical and dependable ways to get top performance from every piece of equipment.

Here are the lubricants Texaco recommended for Frazier-Davis:

Texaco Ursa Oil Heavy Duty—keeps engines clean, rings free, valves properly seated for full power.

Texaco Regal Oil R&O—prevents formation of rust and harmful deposits in compressor systems.

Texaco Universal Gear Lubricant EP—keeps differentials and transmissions running smoothly at low cost.

Texaco Marfak Multi-Purpose 2—protects wheel bearings, chassis, water pumps against dust, moisture and wear.

Texaco Track Roll Lubricant—prolongs the life of crawler mechanisms.

Texaco Rock Drill Lubricant—guards against wear and rust whether drills are running or idle.

Ask a Texaco Lubrication Engineer to help you simplify your lubrication problems and reduce costs. Just call the nearest of the more than 2,000 Texaco Distributing Plants, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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WESTERN CONSTRUCTION

KING PUBLICATION

February
1959
Vol. 34 No. 2

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FRONT COVER—Four of the men singled out for recognition for their service to the construction industry at the annual Beavers meeting. Brief biographies of these men and other awardees begin on page 59.

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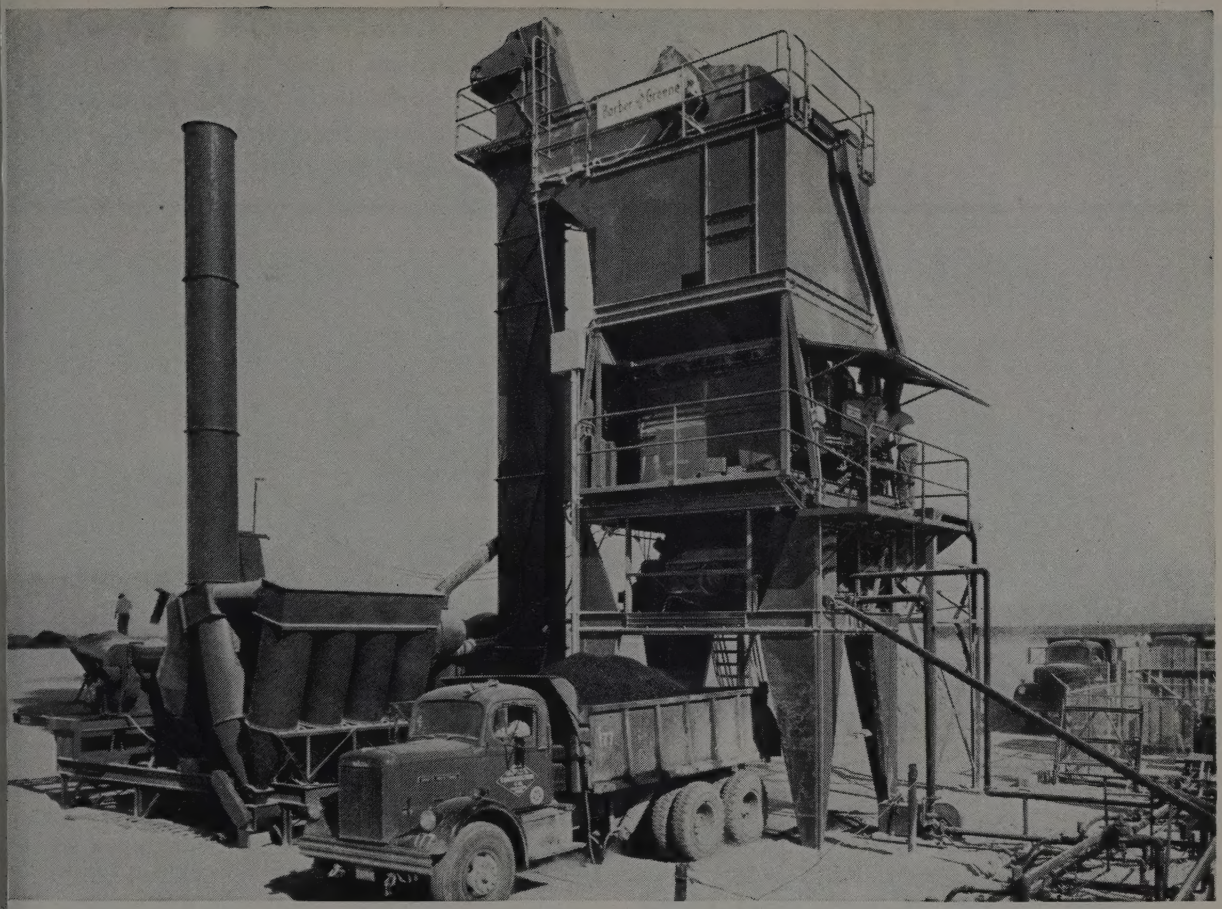

Barber-Greene BatchOmatics offer many exclusive advantages that assure higher tonnages at lower cost. Write for information.

One minute ago this plant was producing a different mix

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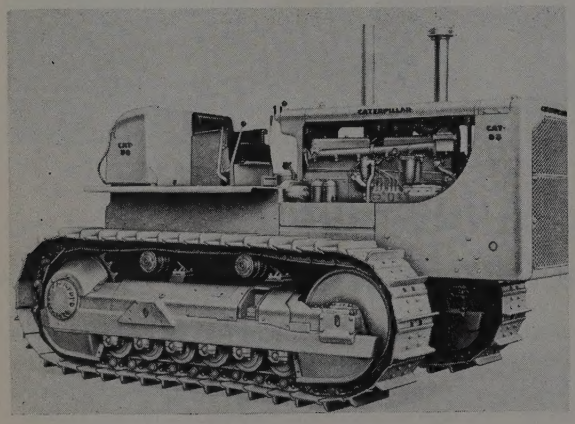
NEW EQUIPMENT

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



New D8 tractor

Caterpillar Tractor Co. announces two completely new Caterpillar D8 tractors. They are designated Caterpillar Series H D8 direct drive and torque converter tractors. They provide increased weight, added horsepower and higher productive ability over the regular D8 troctor. Introduction of these new units has been preceded by a 3½-year development program to make the D8 more profitable for contractors based on the increasing demand for output of tractors at lower costs.

A few figures indicate the increase in size and power of the new units over the D8s they replace. In the direct-drive model the new weight is 47,102 lb. or an increase of 4,377 lb. In the torque converter model the weight of 47,875 lb. is 4,480 lb. more than the old machine. In size, the new models are 9 in. longer and 5 in. higher and the gauge has been increased from 78 to 84 in. Length of ground contact is about 3 in. more in the new model and the ground clearance has been increased to nearly 20 in. or about 50% greater than the older models.

Horsepower has been increased to 225 (flywheel) from the previous 191, or 18%. Drawbar horsepower on the direct drive unit is now 180 which is an increase from 155. This increase in engine power results primarily from the addition of a turbocharger. This unit is designed to match the tractor and results from thousands of test hours on construction jobs before being introduced on the new units. Undercarriage of the new tractors has been improved to add service life through the use of better materials and special heat treating processes. An important development is the introduction of life-time lubricated rollers and idlers. Available for the first time on the D8s. These track rollers and idlers are factory lubricated for their service life, and can be relubricated when rebuilt.

As a result of the increased undercarriage clearance the new D8 tractor will accommodate a 28-in. shoe for better flotation in soft ground.

The new type of dry air filter recently made available by Caterpillar on some other models is now a feature of the engine on the new D8. Transmission on the direct-drive model is directly reversing in all six speeds and the new high speed has been increased to 6.3 from 5.2 mph. Operator comfort and visibility have been improved.

A complete new line of matching tools is also being made available for the new D8s. Designed for greater strength and durability the new accessories are designed to match the characteristics of the new tractors. These accessories include a new U-shaped bulldozer with an 18-in. increase in length and a 6½-in. increase in height. The regular bulldozer on the new model is 9½ in. longer with the back of the blade fully enclosed for added strength and a 2-piece cutting edge making it possible for one man to reverse or replace it. The new ripper incorporates a clevis and tooth combination that provides five different positions.

. . . Circle No. 15

(More New Equipment on page 120)

WESTERN CONSTRUCTION

"They didn't think far enough ahead . . ."

PITY the poor civil engineer of this Western region. If ever a professional group deserved understanding on the part of the general public to place its accomplishments in proper perspective, it is the civil engineers of the West. In spite of much thought and effort in this direction the attempts have been mainly futile. Contact with the public and resulting appreciation continue to represent a canyon that has never been spanned.

How many times in listening to groups of average citizens do you hear the expression "They didn't think far enough ahead . . ." Such criticism is usually pointed directly at projects and improvements that are the creations of civil engineers. Strangely enough, if the TV set fails, or the family car breaks down there is no tendency to criticize electronic engineers or mechanical engineers. Their achievements are talked about as modern marvels. On the other hand, if the water pressure in the shower is low, or the irrigation supply fails, or the community needs an addition to its sewage disposal plant, or the river overflows its banks, then civil engineers are automatically blamed because they didn't plan far enough ahead to avert such problems. And when it comes to highways, the hindsight of the general public is superb and its criticisms equally vindictive. If traffic on the freeway develops the slightest congestion, or an intersection becomes crowded, or the failure of a car (product of the mechanical engineer) causes a bridge tie-up, no holds are barred in blaming the designers and builders of these civil engineering marvels.

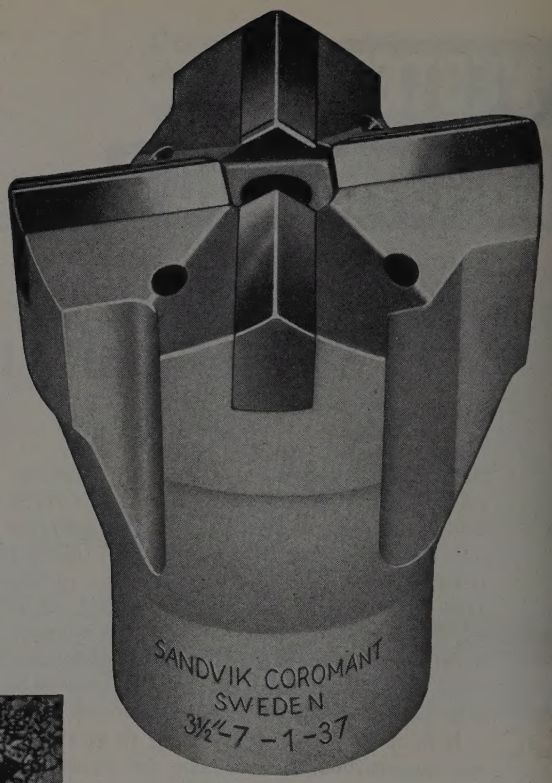
True, many public projects planned a couple of decades ago are inadequate. Scientific predictions made at that time bear little resemblance to Western growth that has taken place in the interval. Perhaps the public would have been sharper in its predictions. But, did these same citizens rise up and object to plans for the Owens Valley Aqueduct as inadequate, or the capacity of the San Francisco-Oakland Bay Bridge as being too small, or Grand Coulee Dam as representing a project insufficient for the future of the Northwest? Usually the citizens tended to refer to such projects as excessive and beyond all reasonable requirements. This attitude was equally in evidence at the small community level where efforts to plan arterial streets, water supply improvements or storm drains were usually criticized as visionary and extravagant. So, the public goes along condemning such developments in the planning stage and criticizing the result a generation later.

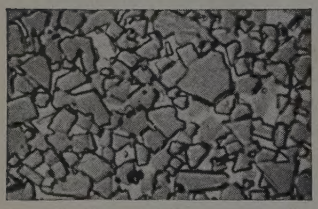
The other important factor applies directly to the pocketbooks of the same citizens. The civil engineering achievements, commonly referred to as public works, are paid for by tax contributions. Such contributions will never provide facilities that exceed the vision of the average taxpayer. But, the taxpayers of the West some 25 years ago, even if possessed with the required vision, were in no position to finance the facilities needed today. It was necessary to plan and build improvements that were geared to the population and economy of the region at that time. In fact, the civil engineering planners of those days deserve much credit for their far-sightedness in pushing through projects that actually did anticipate some of the growth potential.

This Western region owes its present and its future to the works designed and created by civil engineers. The West could not exist today without these projects. If there ever was a group of professional engineers who made possible the growth and development of a region without receiving adequate recognition from the public, it has been the civil engineers of these Western states.

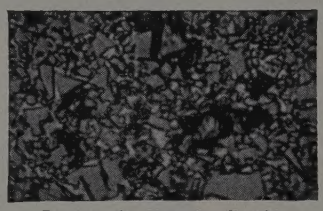
Jim Ballard

Longer bit life— with *new* Sandvik Coromant Bits





Sandvik Coromant Tungsten Carbide (Microphoto) Uniformity of size, even distribution of grain are marked. Free from porosity and impurities —therefore stronger, longer-lived.



Low quality Tungsten Carbide (Microphoto) Black marks are contaminations caused by deficient production control. They weaken the carbide, reduce its working life.

Sandvik Coromant Detachable Bits are Available in the following Thread Sizes and Bit Diameters

Available Diameters, in Inches

Type	Thread	1¼	1⅜	1½	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2¾	3	3½	4	4½	5
SHOULDER	TAPER	x	x	x	x													
	F		x	x														
	113		x															
	H			x	x	x	x	x		x								
	115			x	x													
	D						x	x	x	x	x	x	x	x				
	K													x	x	x	x	
BOTTOMING	1" Rope				x	x	x	x		x								
	1¼" Rope						x	x	x	x		x		x				
	400						x	x		x		x						
	1½" Rope											x	x	x	x	x		
	600											x	x	x	x			
	700													x	x			
	J 7.5															x	x	
	2" Rope														x	x	x	x
	1000																x	

NEXT time you buy bits, specify Sandvik Coromant because they give more footage per bit, lower drilling costs. Here's why:

1 Only first-quality tungsten carbide is used —as shown in the microphotos above. This means less wear, longer life and a better job.

2 The bodies are precision-made of high quality alloy steel—tough enough to take the strain throughout the extra-long bit life.

3 The bigger Sandvik Coromant bits are all of X-design, which prevents rifling. No wonder Sandvik Coromant inserts are the most widely used in the world, drilling more than one billion feet every year.

SANDVIK COROMANT bits are supplied through Atlas Copco, the world's largest manufacturer of rock drills, who also supply Sandvik Coromant integral steels — the most widely used in the world — and Sandvik Coromant extension steel equipment.

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San Carlos, California
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. . . for more details, circle No. 15 on Reader Service Postca

Building record dam in wet weather

Swift Dam with earthfill embankment 512 ft. high s key to hydroelectric project on the Lewis River in Wash- ngton. Problems of placing 15,500,000 cu. yd. of fill when he rainfall averages 120 in. a year were increased with he fast construction pace.

By PAUL BAKER, and staff
Resident Engineer
Bechtel Corporation

HE Swift Hydroelectric Project ow being completed in southwest- rn Washington is the third step of coordinated hydroelectric devel- pment of the Lewis River by Pa- fic Power and Light Co. of Port- nd, Ore. The first project fur- hest downstream, Merwin, (135,- 00 kw.) was completed in 1931 ith Yale (108,000 kw.) the next roject upstream being completed 1953. There are two proposed rojects upstream from Swift hich, if developed, will complete- harness the hydroelectric capa- ilities of the river. An application r license of the Muddy Project, bout 120,000 kw., is currently ending before the Federal Power ommission and the proposed eadows Project, a high head de- lopment of approximately 100,- 00 kw., is currently being investi- ted under preliminary permit.

The Swift Project consists of two tegrated parts, Swift No. 1 being comprised of a dam, reservoir, and powerhouse with 204,000 kw. installed capacity and Swift No. 2 being a 3½-mi. power canal leading to a second powerhouse with 70,000-kw. installed capacity.

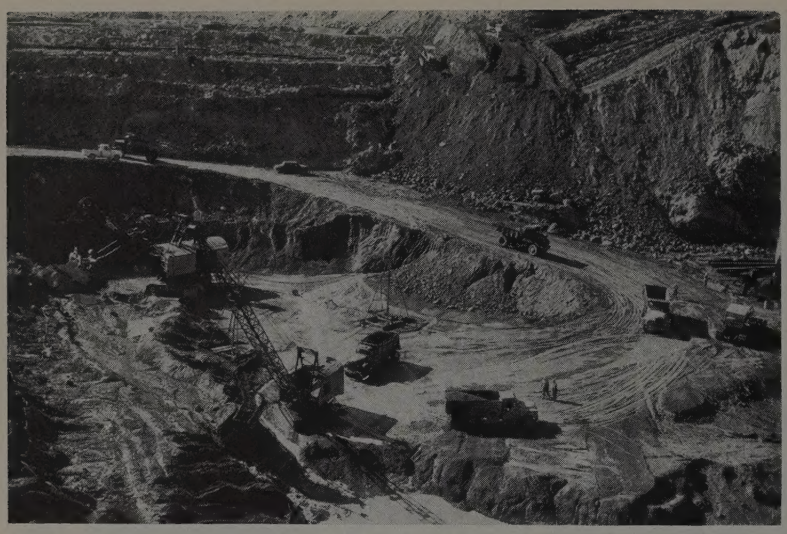
Swift No. 1 project is being constructed by Pacific Power and Light Co. Swift No. 2 project is being constructed by the Cowlitz County Public Utility District No. 1 of Longview, Wash., with the engineering design as well as construction management for both No. 1 and No. 2 being performed by the Bechtel Corporation of San Francisco.

Completion of the project will bring into the Northwest power pool 274,000 kw. of additional hydroelectric power from the Lewis River in just two and one-half years since the start of construction. The bold excavation of a deep cutoff behind a 100-ft. high cofferdam during the winter flood season greatly expedited the construction and saved one whole year in overall construction time. The rapid pace of construction together with the many unusual features of constructing the highest earthfill dam in the world has attracted the attention of dam builders throughout the world.

To accomplish this record a number of unusual construction procedures and techniques were utilized. Early excavation of the cutoff trench was made possible by the use of a temporary diversion channel prior to the completion of the diversion tunnel. The unique design for the pile cutoff also saved additional time. Use of T-1 steel for the spiral cases at Powerhouse No. 1 and stress relieving of the Y branches of the steel plate liners at the job site allowed further savings in time and money. The unusual combined intake and spillway structure was underpinned in order to allow construction to proceed on the intake structure while the power tunnel was under construction. The excellent materials available at the site were investigated and tested in order to insure the continuance of construction during the wet winter weather.

Time schedule

Construction was started in May 1956 with driving of a 2,990-ft. long, 32-ft. diameter horseshoe diversion tunnel through rock in the left abutment. Excavation for the main dam cutoff and construction of the upstream cofferdam was started



TAKING OUT 1,000,000 yd. of cut-off excavation to a depth of about 100 ft. below streambed. Material consisted of 40 ft. of alluvial sand and gravel underlain by a "mud-flow" of volcanic origin. The seal to bedrock consisted of a double row of steel sheet piling filled with concrete.

soon after in June 1956. To gain additional time on the excavation of the cutoff trench, a temporary diversion channel was excavated around the dam site at the base of the south abutment and the river diverted through this channel prior to completion of the diversion tunnel.

Water was diverted into the diversion tunnel on Oct. 8, 1956, and the upstream cofferdam rushed to completion at elev. 725 in early November 1956. The excavation of the cutoff to elev. 500 was completed on Dec. 17, 1956, and on the following day construction of the double sheet pile cutoff was commenced. Construction of the embankment followed completion of the pile cutoff in May 1957 and the 15,500,000-cu. yd. embankment was completed in November 1958, only eighteen months after completion of the pile cutoff.

Starting in November 1956 the power tunnel and spillway construction proceeded concurrently with the construction of the dam. Construction of Powerhouse No. 1 was started in September 1957 and construction of the power canal and Powerhouse No. 2 of the Swift No. 2 project was started in May 1957. Both powerhouses and the power canel were completed and ready for power production last December.

Diversion and cofferdam

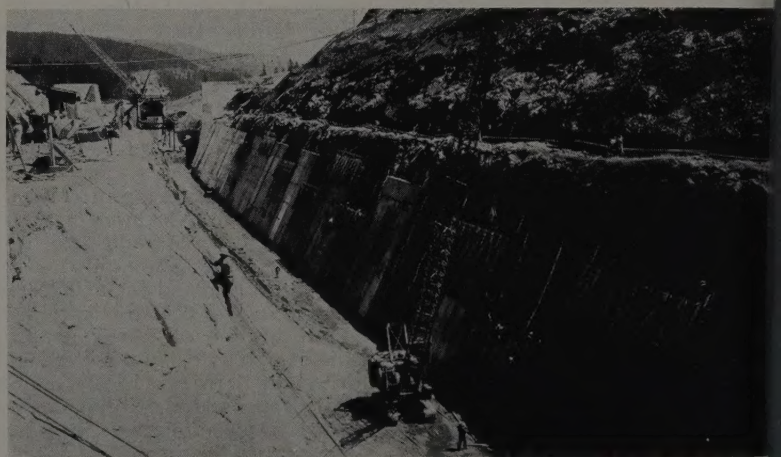
After diverting the river into the diversion tunnel in October 1956 the entire river-bed area was freed for construction of the dam. The river was carried through the diversion tunnnel until the dam had been constructed to elev. 975 which was reached on Sept. 29, 1958. That day a heavily reinforced steel bulkhead gate was dropped into a slot at the upstream end of the diversion tunnel to commence the impounding of water.

The upstream cofferdam forming the permanent toe of the dam embankment was constructed to protect the cutoff excavation against high water during the two winters of the construction period. The cofferdam followed the same general design as the main dam, having an impervious section flanked by random shells and a drain downstream from the core. A drain under the downstream shell permits the use of a relatively steep downstream slope. The cofferdam was constructed of materials excavated from the cutoff trench together with impervious materials secured from an adjacent borrow area.

The cutoff trench excavation consisted of about 40 ft. of alluvial sand and gravel and boulders underlain by reworked volcanic agglomerate or the so called "mud-flow" material which extended to bedrock at a maximum depth of nearly 200 ft. below streambed. The cutoff excavation was carried to about 100 ft. below streambed, and involved about 1,000,000 cu. yd. Below this point a double row of steel sheet piles welded to 18-in. wide flange beams was driven to bedrock. The piles were interlocked thus forming a complete cellular cutoff to rock. These cells formed a unique cutoff which was filled with concrete. Above this point a 30-ft. high concrete cutoff wall extension was constructed for the purpose of increasing the path of percolation through the impervious foundation material.

Steel and stress relieving

Use of T-1 steel rather than the usual mild steel for the spiral cases at Powerhouse No. 1 resulted in considerable saving in weight and thus a saving in time of construction. The high strength steel (yield point of 90,000 psi.) permitted the use of relatively thin plates for the spiral case. These plates were shop welded to form segments of the spiral case with segments of the stay ring attached. The spiral case was shipped to the site in five segments which were then welded together in place. In the field, 5/32-in. Allo Rods Company ATOM ARC T



SPILLWAY chute for the capacity discharge of 150,000 cu. ft. per sec. is a concrete-line trapezoidal section 40 ft. wide at the bottom, with ¼:1 side slope and a length of about 1,300 f

lectrodes and Lincoln 300-amp. elding machines were used to int the plates which varied in ickness from 11/10 to ½ in.

Stress relieving of the Y branches r the power tunnel liner was ac- mplished in the field by heating e parts to be stress relieved with tane gas jet-burners inside of a anket of insulation. Heating was gidly controlled by the use of ermo couples and individual con- ols of the gas burners. This al- wed the stress relieving to be ac- mplished without the construc- n of a field oven which is nor- ally required in such an opera- n.

The power tunnel intake and illway gate structure was com- ned into a single structure, with e intake immediately below the illway. In order to further expe- te overall construction it was cessary to install the steel plate er in the power tunnel simul- neously with the construction of e intake and spillway gate struc- re. This was accomplished by de- rring the construction of three tions of columns in the trash- k structure and supporting the nstruction above this point on o steel plate girders about 40 ft. g and 6 ft. deep. Upon comple- n of the power tunnel and in- llation of the steel plate liner cept painting with coal tar amel), the three remaining col- ns in the trashrack structure re constructed, the load of the ake structure jacked onto these lumns, and the plate girders re- ved.

rthfill in wet weather

Construction of the 15,500,000 yd. of embankment in an area ere the annual rainfall is 120 was made possible by the combi- tion of excellent workable ma- ial and techniques of construc- n which allowed embankment cing to proceed during periods wet weather. The embankment s constructed essentially from worked volcanic agglomerate or udflow", a well graded non-plas- material derived from nearby t. St. Helens, and from stream- d deposits of sand and gravel. nbankment was placed in 15-in. gglomerate) or 24-in. (alluvial terial) layers thus accommodat- g relatively large size material. owever, the large boulders en- untered in the borrow areas re- ired that the bottom-dump Eu- d wagons to discharge with the tes wide open. This often caused e wagons to hang up on the load

LOADING in a borrow area, this Manitowoc 4500 loaded into a fleet of bottom and end-dump Euclids ranging from 15 to 26-yd. capacity. Much of the embankment material was a reworked volcanic agglomerate or "mud-flow" which was well graded and non-plastic. It was the excellent characteristics of available materials that made possible the fill operations during the wet season.

ON THE EMBANKMENT the agglomerate (volcanic) was placed in 15-in. layers. Work continued during one 2-month period when 47 in. of rain fell. Compaction was carried out with two 50-ton Southwest rubber-tired rollers. Placement hit a peak of 66,000 cu. yd. per day.

and required that they be pushed off.

Even in the driest month 1 in. of rainfall per day is common and during the winter it is not uncommon to have storms of 2 to 3 in. of rain per day aggregating 10 in. or more.

During the winter of 1957-1958 construction of embankment was restricted to the use of reworked mudflow material available from a borrow area on the east side of Swift Creek and alluvial sands and gravels from the river-bed of the Lewis River upstream from the site. Except for a few days of freezing weather which shut down the embankment construction completely, since the materials are very frost susceptible, embankment construction extended throughout the entire winter rainy season. It continued even during December and January when over 47 in. of rain fell in the two months period.

The specifications required that the level of the internal drainage zone be kept higher than the rest of the fill; thus, for continued prosecution of the embankment, it was necessary to continue placing impervious core through the winter. In the fall of 1956 the construction of a test fill had shown that the volcanic agglomerate was workable in wet weather. As the job progressed during the winter of 1957, it was found that the material was even more workable than had been anticipated.

The top of the fill was sloped as steep as 8 to 10% which encouraged rapid drainage of wet material and minimized the inclusion of rain into the embankment. Placement was arranged parallel to the slope except in the core which was placed parallel with the axis to prevent the formation of per-

FIELD WELDS were relieved by heating with butane gas jet-burners inside a blanket of insulation. Control was maintained by thermo couples as well as individual control of the gas burners.

meable zones due to segregation or by washing out the fines from between rolls of dumped material.

Rolling with 50-ton rubber tired rollers was in the same direction as placement. This arrangement allowed the drainage of excess water down the roller tracks and the development of small pervious fingers through the shell sections which tend to form additional drainage paths in the embankment. During construction it was found that heavy rains in the order of 2 to 3 in. per day quickly developed surface drainage and permitted rapid runoff whereas slower rains of relatively light intensity were found to soak into the embankment and tended to increase the moisture content of the unrolled material. During the winter season there was enough space on the embankment to allow for drainage of all material placed, although the placing rate was reduced to around 20,000 cu. yd. per day.

The excellent workability of the reworked mudflow material allowed the use of internal type concrete vibrators for hand tamping and it was found that layers as thick as 18 in. could be adequately compacted adjacent to the abutments and adjacent to concrete structures by this method.

In spite of a five weeks strike between July 9 and Aug. 14, 1958 the embankment was constructed to elev. 975 by Sept. 27, which allowed dropping of the diversion gate last Sept. 29, ahead of the original schedule. This was made possible by continued construction throughout the winter of 1957 and 1958. Also, a high rate of production was maintained on a seven-day basis after the strike with nearly 50,000 cu. yd. of fill being placed daily.

Equipment used

Excavation of the cutoff and construction of the cofferdam was started by the Guy F. Atkinson Co. under a force account arrangement with a 2½-yd. and a 5-yd. shovel and a fleet of nine 15-yd. end-dump Euclid trucks. Later this equipment was augmented by a 2½-yd. shovel, a 1½-yd. shovel, four 10-yd. Euclid trucks and nine smaller trucks ranging from 7 to 10 yd. each.

Construction of the main dam was accomplished by the J. A. Jones Construction Co. and Chas. H. Tompkins Co. with a wide variety of excavating and hauling equipment. Eleven shovels and draglines provided an aggregrate dipper capacity of 38 yd., and ranged from a 7-yd. Manitowoc (4500) to a 1½-yd. Northwest 6. Hauling equipment consisted of 53 bottom-dump and end-dump Euclid trucks ranging from 15 to 26-yd. capacity supplemented by 4 to 6 smaller trucks used for hauling aggregates. All of the hauling units had sideboards to increase capacity.

Five water trucks with tanks ranging from 2,000 to 5,000 gal. were used for wetting the fill and sprinkling haul roads during the summer. Rock in the upstream drawdown zone was sluiced in place with a hydraulic monitor which was supplied from Swift Creek by two multistage pumps set in tandem.

Two 50-ton Southwest rubber tired rollers pulled by crawler tractors were used for compaction. From 7 to 9 bulldozers were required for spreading the fill due to the rocky nature of the embankment material. Embankment operations throughout the work were on a two-shift basis with shifts ranging from 8 to 10 hr., depending upon the season. Production reached a peak of 66,000 cu. yd. per day in September 1957.

Project personnel

Pacific Power & Light Co.
E. Robert de Luccia
V. P. and chief engineer
Albert Bauer
Asst. ch. engr. and mgr. of con
Frank L. Beadle
Construction manager
Charles E. Roberts
Construction engineer

Cowlitz County PUD No. 1
O. G. Hittle
Manager
W. J. Mandley
Asst. mgr. and project enginee
C. H. Evans
Assistant to project engineer

Bechtel Corporation
Engineering & Const. Mgmt.
J. P. Buehler
Mgr. of hydroelectric power
Engineering
M. L. Dickinson
Chief hydraulic engineer
J. G. Patrick
Project engineer
Const. & Supervision Mgmt.
Earl E. Nichols
Project manager
Paul W. Baker
Resident engineer
Harris H. Burke
Asst. resident engineer
P. N. Fletcher
Asst. resident engineer
A. J. Carman
Office manager
G. B. McCaughan
Office engineer
W. B. Anderson
Chief of surveys

(Continued on page 30)

Tractor Canopies—Start of a trend?

Corps of Engineers, North Pacific Division, now equires canopies on all tractors, not just those involved n clearing. Idea is to reduce injuries and fatalities due to ollover. Other agencies may follow suit. Here is what ou need to meet the new spec.

ROTECTIVE CANOPIES on awler tractors are nothing new—ere is scarcely a tractor without e in the logging industry and ey are commonplace in construc-on. On construction projects the ecifications usually call for can-pies to be used during the clear-g operation. The protection they ford to operators from falling es and snapping branches is un-estioned and they are welcomed operators and supervisors alike.

Often, if the same contractor es the clearing as the rest of the b, the canopies are left on be-use there is no particular reason take them off. However, the day ay not be far off when canopies ll be required on all tractors; t just those doing clearing but ose involved in any kind of con-uction operation. The reason? otecting the operator and the ctor against rollover. This is ready mandatory in one large vernment agency, the North Pa-ic Division of the Corps of Engi-ers, which includes the Alaska, attle, Walla Walla and Portland stricts.

The North Pacific Division, hich covers much of the West's nopy-conscious logging area, be-me interested in the idea when cidents due to rollover began to crease in recent years. Their de-ion to specify canopies was based rollover studies (both side and d) conducted by the Portland strict, and on earlier studies con-cted in 1955 and 1956 by the S. Forest Service at Shasta Dam, lifornia. These studies showed at a properly constructed canopy t only protected the operator but nded to reduce the chances of tractor rolling completely over. nopies also reduce considerably e damage during rollover.

he new specifications

The specifications adopted late 1958 by the North Pacific Divi-n are based on standards recom-ended by the accident prevention vision of the Oregon State Indus-al Accident Commission. The minimum requirements of the Oregon specifications are as follows:

(1) Uprights shall be of strength equal to but not less than 2-in. double-strength pipe.

(2) Overhead supports shall be of strength equal to the uprights.

(3) Cross members—not less than two cross members of strength equal to the upright shall be provided.

(4) Canopy cover shall be not less than ⅛-in. metal or welded or woven screen of not less than 2-in. mesh, crossed-wires to be of not less than ¼ in. in diameter.

(5) Back screen shall be provided behind the operator's seat and shall be of not less than 1½-in., nor more than 3-in. mesh welded or woven screen, with crossed wires of not less than ¼-in. diameter. Ample clearance shall be provided between this screen and the back of the driver.

(6) Brush guards shall extend from the forward upright of guard to the front of tractor and shall be of a strength equal to the uprights.

(7) Clearance—a minimum clearance of 52 in. is required between the tractor deck or running boards and canopy or supports.

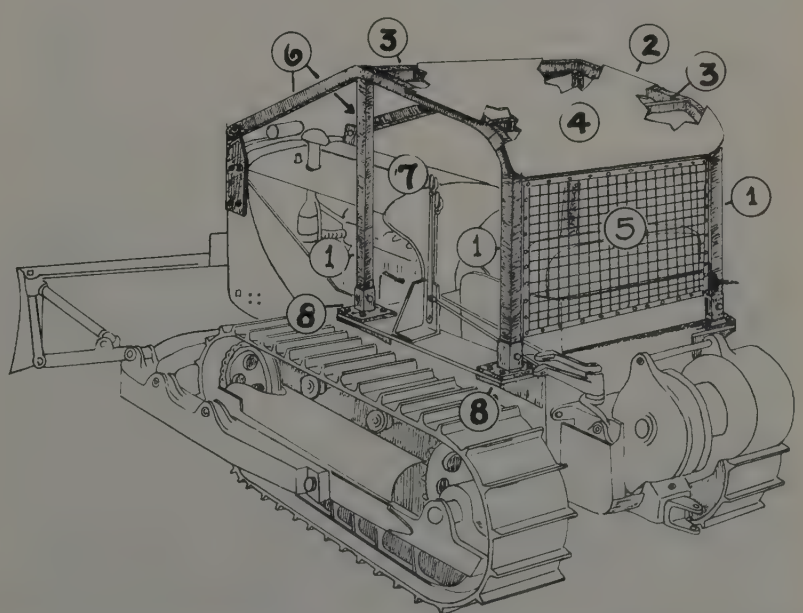
(8) Mounting—uprights shall be mounted to the tractor frame. If mounted to running boards or other supporting surface, additional structural reinforcing shall be welded or bolted to the frame of the tractor to provide supporting strength equivalent to upright members of the guard.

In addition to these requirements the specifications of the North Pacific Division require that:

(a) The canopy frames shall be constructed of extra-strong pipe (ASA Schedule 80) or the equivalent in strength thereof, with minimum requirements as follows—

GROSS WEIGHT INCLUDING ATTACHMENTS WITHOUT CANOPY	PIPE DIAM.
Under 28,000 lb.	2 in.
28,000 to 58,000 lb.	3 in.
Over 58,000 lb.	4 in.

(b) All canopy frames for tractors weighing over 58,000 lb. shall be transversely and longitudinally haunch braced at the intermediate posts with 3-in. extra-strong pipe



THIS DRAWING is taken from the standards recommended by the Oregon State Industrial Accident Commission, on which the Corps of Engineers specification is based. The drawing shows only one of many acceptable types of canopy designs. Numbers are referred to in text.

CANOPIES are normally required only when tractors are working in the clearing phase of a construction job, as on this Oregon highway project. Shown are two Caterpillar D8's.

12 in. long or equivalent gusset braces.

(c) All canopy mountings or attaching brackets shall be constructed and secured to the tractor in a manner to provide support equal to the structural strength of the upright members of the canopy.

Other agencies in the West contacted by *Western Construction* stated that although they were extremely interested in this move by the North Pacific Division, they did not plan a similar move in the immediate future. However, several revealed that they were conducting tests of their own to determine the resistance to rollover stresses of canopies available in their areas.

Resistance from operators

It is generally reported that, while operators welcome canopies when working in heavy brush or during clearing operations, they resist them when rollover is the only concern. They would rather not have any obstacles in their way if suddenly deciding to jump from the tractor during an actual or threatened rollover. Indeed, some test results show that during a multiple rollover a canopy would not save the operator's life even if he were strapped into place by a seat belt. Under severe conditions a shoulder harness may be needed, in addition. It is not surprising that tractor operators resist strongly wearing a seat belt. (The North Pacific Division specification does not include seat belts for the operators.)

These considerations suggest that the most satisfactory way a canopy protects the tractor operator during rollover is by its tendency to stop rollover once the tractor is upset.

Under normal conditions most crawler tractors presently in use on construction jobs will not tip unless the slope becomes greater than about 45 deg.

Other standards

Canopies on tractors on construction jobs in many states are usually required only when the engineer in charge feels that conditions warrant it. But, up to now, the main consideration has been protection from falling objects, whether trees, branches or rocks. In states which have complete Safety Orders, engineers need only direct the contractor to the appropriate specs.

The California Safety Orders, for example, specify a particularly husky canopy. The specification requires that the canopy be connected directly to the frame rather than the running boards, that the structural members be not less than 2-in. extra strong steel pipe, and that the covering be not less than ⅛-in. steel plate on ¼-in. woven wire having not more than 1-in. mesh. The California Division of Industrial Safety makes studies of the canopies available to contractors in the state. Contractors are informed which manufacturers produce a canopy which meets the standards.

Although contractors often mak
their own canopies, there are man
companies in the West which ma
ufacture them. A canopy for
tractor the size of a Caterpillar D
sells for about $950.

Factors affecting stability

Here are a few factors which in
fluence the stability of a crawle
tractor working on a slope.

Speed of travel. The faster th
tractor is moving the less stabl
it is.

Mounted equipment. An
mounted equipment causes a tra
tor to balance differently. Th
higher the hitch the less the st
bility, and implements hitched t
the drawbar may tend to decreas
the weight on the uphill side
the tractor.

Nature of the surface. Ne
earth fills may give way under th
tractor's weight, and rocky su
faces promote side slipping. A su
den stop after a side slip can caus
rollover.

Narrow tracks reduce stability

Excessive loads. If the downhi
track slips under excessive load
it may dig in, increasing the angl
of the tractor on the slope and r
ducing stability.

The information in this articl
obtained from several sources,
intended to indicate some of th
recent thinking of safety engineer
and accident prevention agencie
The several views expressed a
not necessarily those of *Weste
Construction.*

SWIFT DAM

(Continued from page 28)

Jones-Tompkins (dam)
H. T. Newton
Vice president
P. H. Swanson
Construction manager
W. J. Kennish
Project superintendent
D. Carleton
Project engineer
Guy F. Atkinson Co. (powerhouse and canal)
George T. McCoy, Jr.
Project manager
W. M. Chance
Asst. project manager
J. Bowman
Project superintendent
E. M. Watson
Project engineer
Board of Consultants
A. H. Ayers, A. Casagrand
Portland Fox, Julian Hinc
Roger Rhoades, I. C. Steele.

Utility tool of modern construction

Borrowed from agriculture many years ago, the four-wheel tractor has been equipped with many attachments and adapted to construction. With its modern size and power it has become the labor-saving work-horse on large and small jobs.

By T. W. HEMING

Manager, Oakland Regional Sales Office
Tractor and Implement Division
Ford Motor Company

OR 40 YEARS, imaginative contractors have been using four-wheel tractors for a variety of jobs that were previously done by hand. Only in the last several years, however, under the spur of higher costs of manual labor, and with equipment designed as companions to tractors, have contractors almost universally mechanized most of their operations.

The reasons for near-total mechanization are not hard to spot. A swimming pool contractor found that a tractor with a loader and backhoe takes 24 man-hours to dig cavities which had required 120 man-hours when done by hand. A landscaping operator now prepares 3 lots in the same time and with the same crew that could do only one lot before the crew was tractor-equipped. A builder using a fork-lift attachment to unload concrete blocks and bricks now unloads the delivery truck and takes the material to the job site in 12 min., whereas hand unloading had taken an hr. The addition of a tractor and loader to a concrete crew eliminated five men and their shovels and wheelbarrows.

The list of such substitution of machinery for men in construction jobs could be endless. The result every time is the same—mechanical equipment, properly selected and properly used, saves money over hand labor. The low-cost four-wheel tractor with its adaptable hydraulic power has in effect become a mobile power platform that mounts a variety of equipment.

There are 104 different classifications of industry using various combinations of that equipment to increase production and cut costs. The largest number of users of such types of equipment are contractors, of which there are many distinct types. The work of many contractors overlaps but most will think of themselves as in one of the following categories: road, masonry, oil, gas, water well, building, grading and excavating, paving, sewer, pipeline, oil field construction, terracing, and truckers of sand or gravel. For these construction contractors, the most common job for a tractor and companion equipment is loading—earth, sand, gravel, in fact, any bulk material, as well as many items which can be palletized.

The next largest application of tractors to the contractors' work is in the category of scraping-leveling-grading, where front and rear-mounted blades, scoops, and other kinds of earth-moving equipment are used. Digging with tractor-mounted equipment is third on the contractors' list of jobs for mechanized units. Here, the common tool is the versatile backhoe, used generally for footings, foundations, and sewer, water and gas-line trenches and manholes. Towing and lifting is the next category of jobs to which contractors apply tractor power. Another substantial use of tractors is for roadside mowing, by state and county highway departments.

These five major categories fall

USE of agricultural-type tractors by contractors dates back almost 40 years as this picture of an early Fordson shows. On this tractor-pulled scraper rig, the sign on the tractor advertises "Hauling, grading, excavating, hoisting, snow plowing, etc., etc., etc."

THIS TYPE of tractor-mounted box scraper with ripping teeth is of Western origin as is the rollover-type scraper. Both are commonly used in construction combined with a four-wheel general-purpose tractor, mounting an industrial front-end loader.

far short of encompassing the entire range of jobs on which tractor-powered equipment is used for industrial, commercial, residential and public construction or maintenance. Literally hundreds of tools, ranging from power take-off-powered post-hole diggers, saws, pumps and sprayers to stump-handling tongs for attachment to loaders, mobile scaffolds, small concrete mixers, and conveyor systems are available for contractors' jobs. Most commonly used equipment, however, are loaders, diggers, mowers and cutters, post-hole diggers, front and rear-mounted blades, trenchers, snow plows, seeders, rollers and compactors, sweepers, fork lifts, saws and lift-and-carry scrapers.

Construction in the West has always been noted for doing things in a big way. It has, therefore, exerted a strong influence on the design of equipment with sufficient strength and capacity for the rugged service conditions of this region. The box scraper and rollover type scraper are two pieces of equipment which came into wide usage in the West, and now are becoming a common tool for graders and landscapers in the mid-West and East. On tractors with draft-control hydraulics, these can easily be used on cut-and-fill operations.

One way in which the users' influence is transmitted to the makers of equipment is through the manufacturers' retail organization. It is estimated that 80% of the nation's farm equipment dealers also sell some of their products to the construction industry. Many of the products primarily made for agricultural purposes have non-agricultural applications.

Knowledge of the construction industry's needs, and the inadequacies of some agricultural equipment and tractors for such rugged service have brought about significant changes in tractor design and the introduction of special-purpose equipment. Dealers specializing in handling equipment for this market also have been established. A basic philosophy of most equipment producers which also supply the farm market is to develop versatile equipment to get mass-production economies and thereby widen the market substantially.

Any West Coast tract builder, working on 1,000 houses simultaneously, can use highly specialized equipment at every step of his operation. However, the medium-size operator and the smaller contractor must have equipment which can be utilized at capacity. This often means that versatility becomes all-important.

The necessary blend of capacity and versatility has finally been achieved after years of compromising on one or the other. Tractors capable of carrying front-axle loads up to 7,000 lb. and with steering systems of a type previously found only in heavy earth-moving equipment have recently become available in the price class and weight generally considered to be in the "light" industrial category. Likewise, tractor-mounted loaders, capable of handling ⅝, ¾ and 1 cu. yd. of material, depending upon its weight, are now being offered to the construction industry. Similarly, the versatile backhoe is being vastly improved with greater reach and digging depth, ability to tunnel back underneath the tractor and with full power for digging or dumping on either side.

Thus, equipment with high productivity but carrying the low price tags resulting from interchangeability of parts and high volume of production has been made available to the construction industry. Such attachments can be removed readily to enable the contractor to switch to other equipment with a minimum of non-productive time for the change-over.

This versatility at low cost has made it possible for many contractors to perform jobs which formerly were subcontracted. It has also made possible a lower equipment investment for many operators.

While original investment remains a vital consideration, the operating cost of the unit and depreciation rate are of greater importance to most penny-watching contractors, and on both counts the well-designed utility unit may have decided advantages over more limited-purpose higher-cost equipment. One user of both who has disclosed detailed cost figures reports startling economy of new equipment of modern design.

His experience with a new general purpose tractor in the 40-hp class, equipped with a loader, shows hourly operating cost of 13¢, ignoring depreciation. A tractor of the same make but three years older is being operated more than 60 hr. a year at an average hourly cost (without depreciation) of 41¢. With depreciation included, these two units are costing 48¢ and 77¢ respectively, per hour of operation. By contrast, a truck crane, used by this same owner, is costing $4.1 per hr., two rollers have hourly operating costs of $2.24 and $2.8 while graders operate at hourly costs of $3.28 and $5.64.

The economy and usefulness of the "light" industrial units is not overlooked by those organizations whose size warrants use of highly specialized, large-capacity equipment. Just as hand tools should fit the needs of the job, and a sledge hammer isn't used for driving 10-penny nails, the handling of many miscellaneous construction chores by versatile small equipment can free the big machines for places where they are ideally suited. Both types of equipment have distinct applications and their use outside of these areas is unsound and uneconomical.

The future will probably see the "light" general-purpose equipment encroach further on the large-capacity, special-purpose equipment, aided by higher power, more economical operation, and greater operator convenience.

Concreting deck for Glen Canyon Bridge

Leave-in-place steel forms eliminate stripping on 700-ft. high bridge—concrete placed with tilting-tower cableway—slight misalignments eliminated by concrete placing sequence.

ONE OF THE LAST tasks in the construction of the Colorado River bridge—placing the concrete deck has been completed. The earlier stages of construction of this 700-ft. high steel arch bridge, part of the Bureau of Reclamation's dam project in northern Arizona, are described in a 5-page article in *Western Construction's* December 1958 Glen Canyon Dam issue.

The bridge deck is 1,228 ft. in length from abutment to abutment. It has a 30-ft. roadway, two 4-ft. sidewalks, and a 1-ft. curb to give the deck an overall width of 40 ft. There are 1-ft. high curbings on each side and 42-in. high guardrails.

A total of 120 tons of reinforcing steel and 1,030 cu. yd. of concrete with a weight of 3,800 lb. per cu. yd. were used in building the roadway and sidewalks. The concrete was a low-slump mix using about 5 sacks of cement to the yard with a .43 water-cement ratio. This dry mix was combined with 1½-in. maximum heavy media separated aggregate to give 3,000 lb. concrete at 28 days. Contractors for the $4,-9,277 bridge is a joint venture of Judson Pacific-Murphy Co., Emeryville, Calif., and Peter Kiewit Sons' Co. of Omaha, Nebras-. Concrete for the deck was ob-ined from Merritt-Chapman & ott Corp., prime contractor for e Glen Canyon Dam and power-ouse.

The batch plant used by M-C&S to supply the deck concrete is a S. Johnson, with 2 Koehring yd. tilting mixers. The fully auto-atic plant has a 300-bbl. cement orage capacity and can turn out ll over 100 cu. yd. of concrete hour. Ten different concrete ixes can be selected by simply rning a switch.

The concrete was hauled to the idge by a Mack diesel tractor lling a lowboy trailer. Two Gar-o 6-cu. yd. buckets, equipped th air rams for opening the dis-arge doors, were used to handle e concrete. Air for the buckets was supplied by an Ingersoll-Rand compressor with 315 cfm. output.

A cableway with a Lidgerwood diesel-powered hoist capable of a 26-ton load was used to carry the buckets from the truck to the deck. This is the same cableway used for erection of the structural steel for the bridge. The towers of the cableway are mounted on a large ball and socket joint and by means of special rigging the towers can be luffed 21 ft. to either side. This unusual feature enabled the cableway operator to spot the 14-ton loaded concrete bucket at any part of the deck quickly.

Specifications required that the concrete be held at 50 deg. F. or above for the first 72 hr. and above freezing for the next 14 days. This was accomplished by covering the pours with tents made with paper from the American Sisalkraft Corp., and using gasoline heaters with outputs of 100,000 btu.

Construction of the bridge deck was speeded up considerably by the use of corrugated leave-in-place steel forms manufactured by United Steel Fabricators, Inc., a subsidiary of U. S. Steel Corp. These forms, made of 16-gauge galvanized steel, were clipped to the flange of the deck stringers as a part of the permanent deck. Although the cost of the leave-in-place forms is close to conventional wooden forms their use was indicated by the fact that the stripping operation was eliminated. This was an important consideration as near the abutments the deck is separated from the arch by over 160 ft.

The forms for the curb and sidewalks, on the other hand, were of conventional construction, using ⅝-in. plywood forms made at the site by the contractor's carpenters. These forms were easily accessible

(Continued on page 36)

NEAR THE ABUTMENTS the columns between the arch and the deck are 162 ft. long without any intermediate support. Visible in the foreground is an aluminum water line suspended from a cable which spans the canyon. This view is looking downstream.

WHEN WATER MEANT DRUDGERY! The water our ancestors used was as difficult to come by as it was doubtful in quality.

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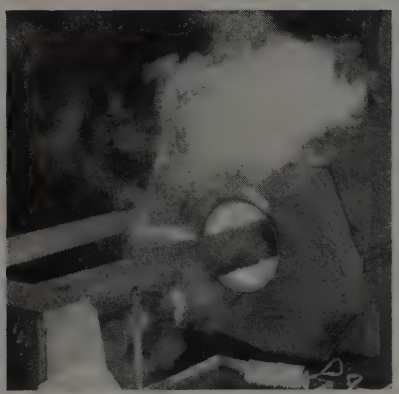
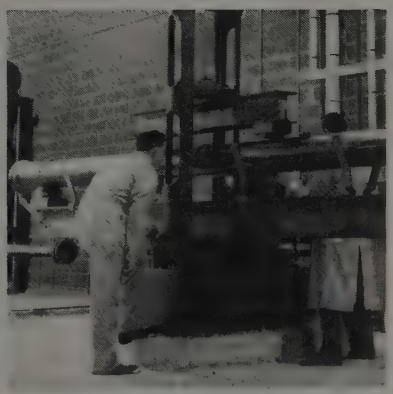
PIPE BEGINS HERE... At one of Pipe's mines near Birmingwhere high grade coking coal, ial to quality, is mined.



PIPE TAKES SHAPE... Molten iron in this rapidly rotating mold assumes its form as pipe—one of many manufacturing steps.



TESTING STRENGTH... Pipe specimens are periodically subjected to more brutal treatment in laboratory than they will receive in normal service.

STRIAL SERVICE CAST IRON

gham 2, Ala. *A wholly integrated producer from mines and blast furnaces to finished pipe.*

... for more details, circle No. 16 on Reader Service Postcard

NEARLY COMPLETED BRIDGE is shown in this aeriel view, looking upstream. Cableway towers at each end, which are on roadway centerline, are now being dismantled to permit completion of approaches. Note upstream and downstream cofferdams ready for closure this month.

SCREED RAILS are being placed during concreting of deck. Rails are simply 1-in. pipe resting on finely adjustable screed chairs. Transit in background will be used to set rail at exact elevation. Bottom slab forms are corrugated steel, left in place permanently.

and were stripped from a rolling cantilever scaffold mounted on the side of the bridge. The scaffold's heavy frame was mounted on rubber rollers for easy movement. Hangers on the outside of the bridge supported a 12-ft. walkway for the 4-man stripping crew. Telephone and bridge lighting cables were placed underneath the walks.

The receiving, placing, and finishing of the concrete for the bridge deck was subcontracted to the Reeder Construction Co., of Albuquerque, New Mexico. About 6 cement finishers and 8 to 10 laborers were used by Reeder for the job.

The design of the bridge is in accordance with the latest requirements of the Interstate Highway System. The bridge is divided into a 70-ft. approach span on the west side, and two 65-ft. approach spans on the east side. On the arch there are four 57-ft. bays on each side, two 50-ft. bays on each side, and nine 44-ft. bays at the middle.

The concrete roadway is supported by 5 deck stringers made up of 36-in. wide flange I-beams, running 260 lb. to the foot, and 30-in. I-beams, running 130 lb. to the foot, depending on the length of the span. Each sidewalk is supported by a box girder made up of plates and angles. The stringers in turn are supported by the bents, or column supports, made up of 2 vertical columns and an alloy steel plate girder.

Correcting misalignments

A carefully calculated concrete placing pattern served to remove whatever slight misalignments were in the steel structure. When the deck work started, the center of the arch was a hair high and the quarter points low with respect to the abutments. To force the center down and the quarter points up, concrete was placed first in the center, then the abutments, then on each side of the center pour, then the ends, and finally joining the gap on each side of the center. A total of 47 pours were required. Concrete was always placed across the full 30-ft. width of the roadway.

A second problem facing bridge designers was the deflection or sag in the deck stringers as they spanned between the columns. If the concrete roadway conformed exactly to the stringers the result would be a wavy surface. Traffic passing over such a wavy deck would subject the bridge to increased vibration and stress.

To compensate for the deflections, the concrete slabs near the center of the stringers were increased from 1/16 to 1/8 in. above the theoretical 6-in. thickness of the deck depending on the length of the pour and size of the stringer.

An exact control over the thickness of the deck was maintained by using a screed chair manufactured by Intermountain Specialties Co., of Salt Lake City. The bottoms of these chairs were welded to the deck while the threaded ends permitted fine height adjustments. The cup-shaped tops of the screed chairs held the rails, which were simply 1-in. inside diameter pipes cut to fit the length of the pour. Both the rails and tops of the chairs were removed after the concrete was poured and spread.

Personnel

Project manager for Kiewit—Judson Pacific-Murphy was Francis J. Murphy. Superintendent was William Choate. Al Tokola was project engineer.

For the Bureau of Reclamation L. F. Wylie is project construction engineer at Glen Canyon. Robert Sailer, head of the bridges section in the Denver office, designed the bridge.

Monkeys" Here

A. Wilson & Sons Construction Company, St. rys, West Virginia, ran into a double-barreled llenge on their 3-mile segment of the new Inter- e Highway #81 in Berkeley County, West Vir- a: a combination rock removal and dirt grading They had to make a choice between costly blast- or removing rock with equipment. Their decision: , rip and roll out the road site with massive road- ding equipment.

he equipment was purchased from Walker Ma- ery Company of Charleston, West Virginia. C.I.T. oration financed the heavy equipment like this Cat D9 tractor with a ripper attachment. This ice helped the Wilson Company perform on time a profit. Alfred E. Wilson, president, had this y: "We owe a great deal of thanks to C.I.T. and fine service. Another thing which will help a lot e C.I.T. "skip-payment" factor in the winter her months—particularly with the type of winter her we have around here."

How Job-Engineered Finance Plans Help Contractors

l Plan equipment financing terms to 6 years with nent schedules related to depreciation, or equal hly payments over 36 months, or skip-payment s where needed . . . these are just a few of the ul financing tools offered by C.I.T. Corporation.

addition to equipment purchase financing, C.I.T. elp improve contractors' bid and bond capacity, current operating expenses or other business s by arranging capital loans. C.I.T. representa- know how to lay out "job-engineered" finance , carefully devised to fit the needs. Why not call ite? No obligation, of course.

Here's part of the million dollar Wilson fleet working on the Route 81 job. It took modern equipment and plenty of it to lick rocky, heavily wooded terrain like this.

Robert W. Ingram, Wilson Company superintendent (right), and C.I.T. representative John Baysden visit the job site. Early 1959 is the target date for the completion of all dirt grading.

How handling can affect aggregate

Preliminary studies show serious reduction in cleanness develops with certain types of materials as a result of processing, and also in mixing. Clay-cemented sandstones are schists that need watching.

By F. N. HVEEM

Materials and Research Engineer
California Division of Highways

THE California Division of Highways has adopted two new test procedures aimed at detecting the amount of deleterious clay in mineral aggregates. Two separate tests are involved: (1) the Sand Equivalent Test, which is applicable to the fine materials passing a No. 4 sieve, and (2) the Cleanness Test, designed for application to coarse aggregate retained on a No. 4 sieve.

The first of these methods, the Sand Equivalent Test, was originally intended for application to untreated gravel or crushed stone materials as a quick field test to detect unstable materials caused by an excess of wet clay. The test was then extended to fine aggregate for asphaltic mixtures to detect clay coatings on sand grains. Finally it was found to be significant for concrete sands as laboratory investigations showed that both strength and volume change were adversely affected when the Sand Equivalent values were low (indicating excess clay).

In order to have a companion test to assure the coarse aggregate would be free from clay coatings, the Cleanness Test was developed. By means of an empirical formula, the numerical values derived from the Sand Equivalent Test and from the Cleanness Test have been made fairly comparable. We now specify that both sand and coarse aggregate should show not less than 75 in both tests.

Last summer, however, we were disturbed to learn that concrete aggregates between 1½ and ¾-in. sieves that had passed the Cleanness Test at the original production plant would not pass the test when sampled at the weigh hopper of the batching plant. This observation led to a rather extensive investigation which is still under way. However, the initial evidence is so striking it appears worth describing.

In a typical case, the aggregates are produced in a large commercial plant, at which time the material is washed thoroughly, and then as an additional precaution each truck load is flushed with a 6-in. stream of water during loading. Samples taken from the trucks at this point show a Cleanness value of 82. When sampled again from the same truck at the end of a 25-mi. truck haul, the value dropped to 78. After unloading, going through the elevator and into the weigh hopper of the batching plant, the value dropped to 47.

An inspection of the aggregate at these three points indicated that this did not result from a vagary in the test method as the stone in the weigh hopper was virtually unrecognizable, being visibly coated with a heavy layer of dust and fine material. This change in appearance from clean to dirty simply by the process of handling raised immediate problems as to time and place of sampling and the question of establishing the point where the materials must meet the specification.

While these questions are troublesome enough, the more serious one relates to the effect on the quality of concrete. It so happened that at the time this discovery was made the laboratory had been called upon to investigate and report on the causes for excessive cracking of a concrete building constructed about four years ago. As it is common experience to encounter delays in discharging concrete from truck mixers, it was inferred that much of the concrete in that building may have been held in the revolving drums for substantial periods at the point of delivery. The fact that there were such delays was confirmed by the job records.

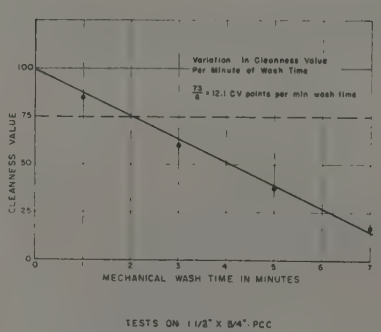


CHART shows how Cleanness Value drops as washing time increases. Washing was done mechanically to eliminate variations.

Out of the laboratory come ideas that often result in changing field procedures. Frequently, these studies require months and years to arrive at decisions that represent positive conclusions. Occasionally the laboratory has preliminary observations, which will take much time to confirm, but which can profitably be passed on to others.

In this case, some information that could have an effect on the production and handling of aggregate was of sufficient interest and potential importance to justify its discussion by others at the recent San Francisco AASHO conference. Accepting the preliminary nature of the finding, the possible effect on some aspects of aggregate handling makes it logical to pass the information to readers in its present form.

Editor

Initial trials using a small laboratory concrete mixer have shown that with prolonged mixing these aggregates grind up sufficiently to have a marked effect on the water cement ratio. In fact, it was necessary to increase the amount of water from 5.9 gal. per sack to 11.3 gal to maintain a constant slump during 90 min. of mixing.

To eliminate the variability of hand washing as performed by different operators, the Cleanness Value Test requires that the sample of stone be agitated and washed in a stainless steel vessel clamped to a Tyler portable sieve shaker. The standard procedure requires agitating or scrubbing the sample of 1½ x ¾-in. stone in water for a period of one minute. (Finer sizes are given a longer period.)

In the course of the investigation, experimental runs were made in which the sample was agitated up to a period of 7 min. The results

(Continued on page 46)

"Armco Drainage Structures help us speed up installation"

Under this industrial railroad to the Midland Collieries, Inc., is an Armco MULTI-PLATE Pipe, 102 inches in diameter. Many other Armco Drainage Structures are installed under this same line.

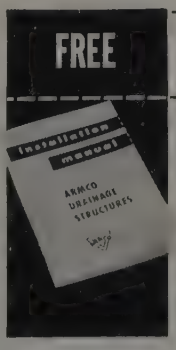
said Mr. H. W. Hartmann, Vice President of McDougal-artmann Co., well-known engineers and contractors of Pe-ia, Illinois. He was referring to his company's installation of mco Corrugated Metal Drainage Structures on a nine-mile ilroad line for Midland Collieries, Inc., of Victoria, Illinois. Time was an important factor in this job because the coal rporation wanted to use the railroad before winter set in. ot only did the contractor find the Armco Structures time ving, but Mr. Hartmann also said, "Armco Structures were re economical to install."

The drainage project—involving Armco MULTI-PLATE® Pipe d Pipe-Arch—included a total of 8 structures; diameters (or uivalent) range from 78 to 168 inches, and have a total gth of 566 feet.

• • •

rrugated Metal Drainage Structures comprise just one group the more than 30 Armco products. Use coupon for data. mco Drainage & Metal Products, Inc., 2180 Milvia St., rkeley 4, Calif. or P. O. Box 751, Federal Station, Port-d 7, Ore.

Here is another Armco MULTI-PLATE Pipe, 168 inches in diameter, in final stages of assembly, for installation under the same railroad line.



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The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

. . . for more details, circle No. 19 on Reader Service Postcard

Scraper fleet hits 2,500 yd. per hr.

A team of 13 scrapers, each one 18 in. longer and 18 in. higher than normal, are setting a fast pace on a 6,000,000-yd. subdivision project.

BIG MACHINES and lots of them, to keep production high; each machine well matched to its job so that it can work at top capacity; and a thorough maintenance program to keep down-time at a minimum—these are the characteristics of nearly every successful earthmoving job. They are very evident on a project in Westlake, Daly City, California (near San Francisco) where a fleet of equipment is swarming over a rugged 150-acre site. Contractor Arthur "Buzz" Haskins is moving 6,000,000 cu. yd. of earth for a subdivision. The land is being moved into a rolling saucer-shaped contour to provide space for 1,000 homes, 600 apartments.

In addition to the earthmoving and grading, Haskins is handling the underground work. Owner of the project, Henry Doelger, Builder, Inc. follows the $3,000,000 earthmoving and development phase closely with the construction of homes and streets.

When Haskins started the job he found the site divided by a deep gully in the northern section and a ridge several hundred feet high in the center. When the job is completed 4,500,000 yd. of material will have been taken from the ridge. This plus another 800,000 yd. will be required to fill the gully and other low spots.

Before filling operations could begin the water problem had to be solved. The site was laced with small but constant underground streams. A system of drains was installed to carry water to a silting basin. From the silting basin the water was directed to a nearby creek.

Haul roads were carefully planned and laid out to keep the average run between 2,000 and 2,500 ft. at small grades.

Most of the material being moved is densely packed sandy soil, which requires no blasting but is very abrasive and hard on equipment. In the cut tractor-mounted Ateco rippers on Caterpillar D8's and D9's loosen the material for the scrapers. The double-push loading technique is being extensively used in the cuts. Using two pushers gets the scrapers out of the pit in up to one-half the time with several extra yards of payload. For the tandem pushing job, Haskins is using a modified C-frame on the first pusher. No special push-blocks are used. The C-frame is easily removed to allow use of rippers when necessary. To increase the capacity of the scrapers they were lengthened 18 in. by the Peterson Tractor Co. of San Leandro. The scrapers also carry 18-in. sideboards. These modifications enable the Cat DW20's to carry up to 35 cu. yd.

The haul roads are so well maintained that the earthmoving rigs can attain top speeds in racing to the fill. They travel at a maximum of 45 mph. and dump at speeds up to 35 mph. on occasion. Skilled operators are essential to keep the equipment moving smoothly at such speeds.

For compaction the contractor is using two DW15 tractors pulling 30-ton pneumatic rollers, four 4x4 sheepsfoot tampers, and a DW20 tractor pulling a 75-ton Southwest pneumatic roller. The DW20 and DW15's have cable-operated dozer blades. The bottom of the blade is fitted with skid shoes for knocking off high points on the ground. The gooseneck on the compactor was modified to fit the tractor. Pulling the rollers with rubber tired tractors has greatly speeded this phase of the operation. Goodyear is supplying tires for the project.

The high speeds at which the equipment is moving combined with the abrasiveness of the material is causing above normal maintenance problems, especially o

(Continued on page 46)

size or kind of job

7 MODELS

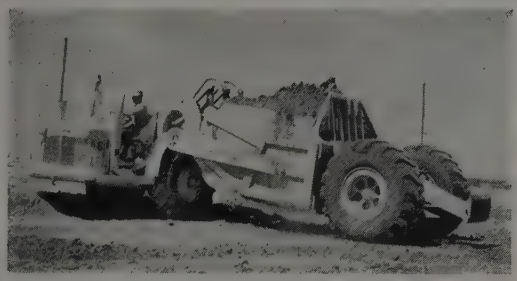
job proved for high production

TS-24

The Model TS-24 has a 300 h.p. engine for the tractor and a 218 h.p. engine for the scraper... each with a separate Torqmatic Drive. Heaped capacity at 1:1 is 32 cu. yds.... 24 yds. struck. Full 90° hydraulic steering ... 27.00 x 33 tires with 33.5 x 33 optional.

SS-12

This 4-wheel tractor model has a struck capacity of 12 cu. yds.... 17 yds. heaped ... with 218 h.p. engine and 5-speed transmission. Tire sizes are 12.00 x 25 front and 21.00 x 25 on drive and scraper wheels with 24.00 x 25 optional.



S-7

Model S-7 is equipped with 143 h.p. engine ... 18.00 x 25 tires ... 4-speed Torqmatic Drive ... full hydraulic 90° steering. Capacity is 7 cu. yds. struck and 9 yds. heaped at 1:1 slope. Optional tires are 21.00 x 25.

SS-18

The Model SS-18 has a 300 or 320 h.p. engine and 3-speed Torqmatic Drive or a standard 10-speed transmission. Capacity is 18 cu. yds. struck and 25 yds. heaped. Drive and scraper tires are 24.00 x 25 with 29.5 x 25 optional... hydraulic booster steering.

S-12

Powered by a 218 h.p. engine, the Euclid S-12 Scraper has a 5-speed transmission ... 24.00 x 25 tires ... full hydraulic 90° steering. Struck capacity is 12 cu.yds..... at 1:1 heap, 17 yds.

SS-24

A 325 or 335 h.p. engine with Allison 4-speed transmission and converter lock-up powers the Model SS-24. Struck capacity is 24 cu. yds.... 32 yds. heaped. Drive and scraper tires are 27.00 x 33 with 33.5 x 33 optional for maximum traction and flotation.

S-18

This Model S-18 has a 325 h.p. engine with 4-speed Torqmatic Drive and converter lock-up. Struck capacity is 21 cu. yds.... 30 yds. at 1:1 heap. Tires are 27.00 x 33 with 33.5 x 33 optional ... full hydraulic 90° steering.

"Euc" Scrapers have hydraulic lever action, 4 section adjustable and reversible cutting edges, unequalled accessibility for servicing and other cost-cutting advantages. Check job performance and return on investment before you decide on any scraper equipment.

EUCLID
Division of General Motors Corporation
Cleveland 17, Ohio

for more details, circle No. 21 on Reader Service Postcard

SKID SHOE is pointed out by Bernard Piombo, master mechanic (right), Melvin DeMattei, superintendent (left), and Arthur Haskins, owner (standing). The shoe is mounted behind the 'dozer blade of a DW-20 used to pull a pneumatic compactor. The shoe knocks off high spots as the rig moves over the fill.

track-mounted equipment. For instance, rollers and tracks have to be replaced every 1,000 hours instead of the normal 2,000 hours or better. A thorough preventive maintenance program is in force to keep down-time at a minimum. During the half-hour lunch break, between shifts, and on Saturday mechanics go over the equipment. On Saturday the normal 3-man field force is reinforced by 2 mechanics and an oiler's helper from the contractor's main yard in South San Francisco.

The South San Francisco shop is a Butler building with 10,000 sq. ft. of floor space. There are two 5-ton traveling overhead cranes which can handle any part of the earthmoving fleet. The shop features air and electric outlets at 20-ft. intervals. There is a steam cleaner, a 300-amp. welding machine and a new motor support work bench recently put on the market by Patterson & Kenworthy of Stockton, California.

The preventive maintenance program has cut down-time to less than 4%. The contractor's 30 tractors put in about 6,000 hr. a month, yet only 5% of the motors are overhauled during the year.

If equipment does break down while on the job, Haskin's car as well as the cars of his project manager and 2 grading foremen are radio-equipped so that maintenance trucks can be quickly dispatched.

Personnel

Superintendent for Haskins is Melvin De Mattei. Dick Keeman and George Crane are project foremen. Herbert Haskins, brother of the owner, is in charge of pipeline work. Master mechanic is Bernard Piombo, assisted by Robert Ray.

Representing Henry Doelger, Builder, Inc., is Carl W. Timmons, civil engineer.

Subdivision design and layout is done by the engineering firm of Theodore V. Tronoff.

Soils engineers are Woodward, Clyde & Gerrard.

Major equipment

- 8 Ateco tractor-mounted rippers
- 1 Northwest Model 41 crane
- 1 Caterpillar 977 Traxcavator
- 10 Caterpillar D8 tractors
- 5 Caterpillar D9 tractors
- 9 Caterpillar DW20 tractor-scrapers
- 4 Caterpillar 463 scrapers
- 2 Caterpillar DW15's with compactors
- 1 Southwest 75-ton pneumatic roller
- 1 Diamond T diesel truck
- 1 Peerless 45-ton trailer
- 10 pickup trucks

Arthur Haskins, contractor

Arthur Haskins has been in the grading business all his life. He started as an operator and a mechanic and worked his way up to foreman and superintendent. He now is owner and manager, and directs the entire Daly City earthmoving project from his radio-equipped station wagon. He started business on his own in 1950 with a single D7 tractor. In 1951 he added two D6's. In 1954, with 12 pieces of equipment, he took on a 1,000,000-cu. yd. earthmoving job in South San Francisco. Today he has 40 pieces of the latest earthmoving equipment, modified to his own particular needs, and representing an investment of more than $1,000,000. He employs 50 men.

AGGREGATES

(Continued from page 40)

showed (see chart on page 40) that the Cleanness value is inversely proportional to the length of time the sample is agitated. On the other hand a similar curve for material which has given no trouble shows no evidence of extraordinary breakdown due to handling.

It must be emphasized that while some degradation occurs with all aggregates this extreme breakdown is by no means common. Thus far, it has been observed only with materials from one region of California. A petrographic examination discloses the fact that the degradation and development of clay may be traced to clay-cemented sandstones and schists which exist in the gravel deposits.

It is important to realize, however, that aggregates which meet all conventional requirements for hardness and abrasion such as the Los Angeles Rattler Test or even the Wet Shot Test can degrade sufficiently through handling to produce an amount of clay which is detrimental, and such degradation can take place in the concrete mixer.

While there is ample evidence that satisfactory concrete can be manufactured from these materials, it appears obvious that it will be necessary to rigidly restrict the mixing periods when materials of this type are involved. In the light of this experience, one cannot accept without reservation the widely published conclusions that concrete may be mixed for periods ranging up to one and one half hours without adverse effects.

This brief report was presented for discussion purposes before the Committee on Materials, AASHO Annual Meeting, San Francisco, Dec. 4.

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AM BLACK TOP SPREADER handles hot or cold ix for patching or paving. Unit has separate power nd all-hydraulic controls — rides on own pneumatic res. Lays up to 8-ft. widths, adjustable from 0 to 3-in. Thickness also adjusts 0 to 6-in. Hopper capacity — 2 cu. yd.

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AIN-ROY BACK HOE — This finest of back hoe tachments, with all-hydraulic controls, has a 12-ft. gging depth and a working radius of 190° for both gging and dumping at right angles. Cuts vertical des, square corners, level grades — digs bell holes, enches, pits.

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RAM ROTARY PLOW — Separate power unit drives blower to load trucks or cast to either side. Double or triple augers available. FORK LIFT easily interchanges with bucket. Adjustable spacing fits various sizes of loose or pallet loads. Powerful hydraulic controls handle heavy loads.

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Organizing a pre-bidding inspection

A project that includes 8 dams, 13 mi. of tunnels, 3 power plants and 31 mi. of canal, combined with sites at high elevations and unusual financing, indicated that many advantages would be gained from a conference and field trips with prospective bidders. Project on Feather River described and organizing of inspection trip reviewed.

By H. K. PRATT
Project Engineer
Power & Industrial Division
Bechtel Corporation

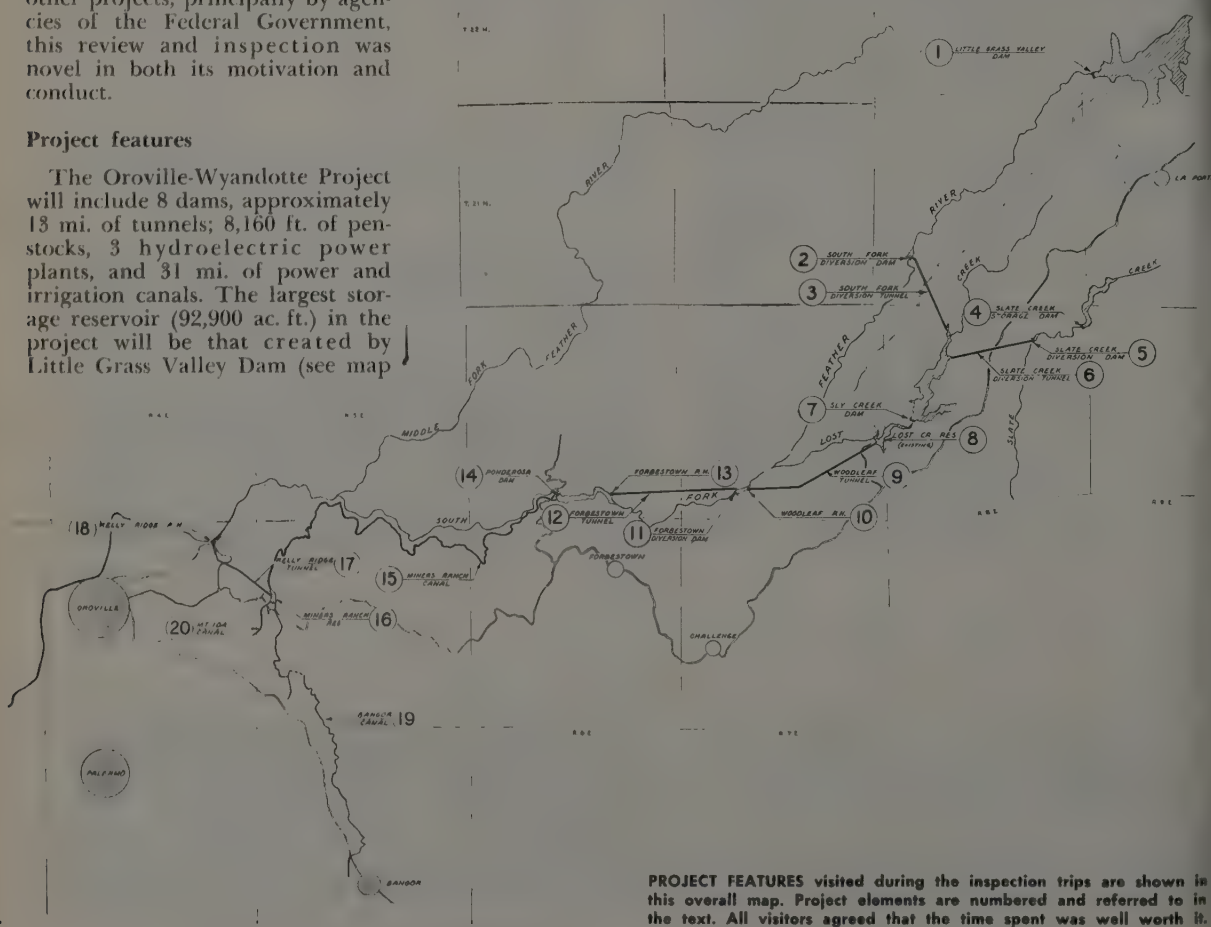
A PRE-BIDDING review and inspection of the hydroelectric and irrigation project to be built on the South Fork of the Feather River in Northern California by the Oroville-Wyandotte Irrigation District was held last October to afford interested contractors an opportunity to become acquainted with the project and the physical characteristics of the area. Although a number of pre-bidding conferences have been held during recent years on other projects, principally by agencies of the Federal Government, this review and inspection was novel in both its motivation and conduct.

Project features

The Oroville-Wyandotte Project will include 8 dams, approximately 13 mi. of tunnels; 8,160 ft. of penstocks, 3 hydroelectric power plants, and 31 mi. of power and irrigation canals. The largest storage reservoir (92,900 ac. ft.) in the project will be that created by Little Grass Valley Dam (see map (1), located on upper reaches of the South Fork of Feather River. It will be a rockfill structure 204 ft. high with a gate-controlled chute spillway and tunnel outlet works. Several miles downstream will lie South Fork Diversion Dam (2), a concrete arch structure 60 ft. high, which will divert flow into South Fork Tunnel (3), about 14,350 ft. long.

On Slate Creek, a tributary of Yuba River, the next major watershed to the south, there will be two dams, both concrete arches. The upper (4) will provide regulatory storage and serve as a debris barrier. Flow released from it will pass to the lower dam (5) and be diverted into Slate Creek Tunnel (6), about 12,700 ft. long. Both the South Fork and Slate Creek tunnels will discharge into the upper reaches of Sly Creek Reservoir (7) on Lost Creek, a tributary of South Fork of Feather River. Sly Creek Reservoir will be created by a rockfill dam 265 ft. high with a gate-controlled chute spillway and a tunnel outlet works in the left abutment. This reservoir (59,800 ac. ft.) and Little Grass Valley will provide the major storage for the project. The portion of the project down to and including Sly Creek will function primarily to concentrate available flow at a single location where it can be passed through the power plants and distributed for irrigation.

Immediately downstream from Sly Creek (8) lies the existing Lost Creek Dam and Reservoir, constructed 35 years ago. Lost Creek



PROJECT FEATURES visited during the inspection trips are shown in this overall map. Project elements are numbered and referred to in the text. All visitors agreed that the time spent was well worth it.

2-yd Loader Averages 2,700 yd Per Day for 5 Months on 2½-Million-yd Borrow Job

JOB: Relocation of Route 5 from Longmeadow, Massachusetts, to state line of Connecticut. 2½ million yards of borrow. Started last summer.

REPORT: — "Everyone in the area, it seems, who owns a shovel and a couple of trucks, is hauling on this job," says an on-the-spot reporter.

"The center of attraction, though, is the 2-yd TL-20 TRACTOLOADER* owned by Enfield Road Construction Company, Enfield, Connecticut. It sure is building a reputation for itself.

"It fills a 12-yd truck every 3½ minutes. Averages 2,700 yd in a 10-hour day. It can be, and has been, pushed to 3,000 yd."

One of the reasons for this fast loading is Tractomotive's *exclusive* ONE-LEVER control of speed and direction. Operator goes into and out of any forward or reverse gear while moving—always works at highest possible speed.

Some of the other reasons for the TL-20's outstanding performance include: LONGER REACH — you dump loads right into center of high truck bodies. GREATER STABILITY — more operating comfort, less spillage. STRONG, PIN-CONNECTED AXLES — no rolling and shifting under load.

See how the TL-20 can increase your production. Your ALLIS-CHALMERS dealer will be glad to show you.

*TRACTOLOADER is a registered Tractomotive trademark.

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DIVIDED into three groups, bidders drove their own cars to all sites on or near existing highways. Careful scheduling permitted visiting several locations each day without interference from others at the site to be inspected.

AT SOME LOCATIONS private cars were left behind and the groups were transported to construction sites by multi-drive trucks. This group is headed for Slate Creek Dam site.

is a concrete arch structure 117 ft. high that now provides storage for the irrigation district, serving one of its main canals. Following completion of the project, Lost Creek will serve as a forebay for diversion into Woodleaf Tunnel (9) whose upstream portal will lie about 60 ft. below reservoir level. From Woodleaf Tunnel, approximately 18,230 ft. long, water will pass through a powerhouse of the same name (10) which will contain one vertical-shaft multi-jet impulse turbine rated at 71,000 hp. and 1,443-ft. head.

Forbestown Dam (11), a concrete arch 91 ft. high, will form the tail race for Woodleaf Powerhouse and divert flows into Forbestown Tunnel (12). Forbestown Tunnel, 18,270 ft. long, will lead to Forbestown Powerhouse (13) which will contain one vertical shaft reaction turbine rated at 39,000 hp. at a head of 795 ft. Ponderosa Dam (14), a concrete arch 145 ft. high with gravity thrust blocks at the abutments, will serve as an afterbay for Forbestown Powerhouse, provide some storage, and function as a diversion dam. It will be located at the headwaters of the reservoir to be formed by Oroville Dam, now under study by the State of California.

Miner's Ranch Canal (15), into which flow will be diverted by Ponderosa Dam, will be approximately 17 mi. long and will convey flows to Miner's Ranch Reservoir (16). This reservoir, which will serve as a distribution point for irrigation and power releases, will be formed in the headwaters of a small natural water course by an earth and rockfill dam 60 ft. high. From the reservoir, water will be fed to the Bangor (19) and Mt. Ida (20) irrigation canals and to the Kelly Ridge Tunnel (17) 4,780 ft. long, which will serve Kelly Ridge Powerhouse (18), containing a vertical shaft reaction turbine rated at 13,000 hp. at a head of 268 ft.

Bechtel Corporation was retained by the irrigation district in the spring of 1958 to undertake design and construction management*. Field work on subsurface exploration, location of construction materials and supplementary surveying was initiated in July 1958. The schedule calls for initiation of construction this spring with completion by the end of 1961.

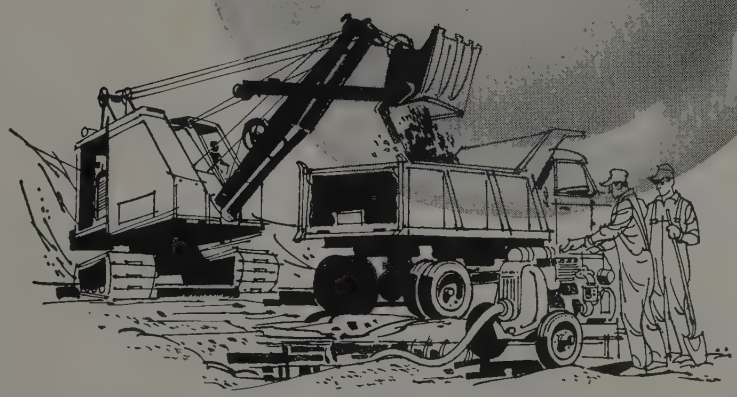
Considering the magnitude and relative intricacy of the project, it was evident that invitations for bids could not be issued until sometime after the start of 1959. Since project features lie at elevations ranging from 200 to 5,000 ft. above sea level, and since the upper portions of the project lie in one of the heavy snowfall belts of the Sierra Nevada, it would be impossible for contractors to make a satisfactory inspection of many of the sites after invitations for bid had been issued.

Consequently, it was decided early in the exploration period that a prebidding inspection would be held to provide those interested an opportunity to become familiar with the terrain and project sites prior to the onset of winter. As the time for the inspection approached, design was, of course, far from complete, but had progressed sufficiently to establish type and general magnitude of structure for each site. The best available data, consisting of a written description of the project, a summary tabulation of pertinent physical data and a table giving principal construction quantities for each feature, supplemented by 44 maps and drawings, were assembled, multilithed and bound for reference of participants during the field trip.

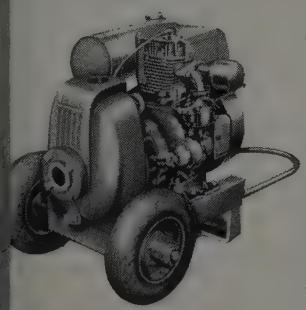
To provide participants with background which would make the field inspection more profitable, an initial day was set aside for briefing in Bechtel's San Francisco office. This meeting was addressed by John P. Buehler, manager, Hydro-Electric Power; J. George Thon, chief civil engineer, Power and Industrial Division, and the writer. The historical, legal and financial background of the project was explained, followed by a brief description of each project feature. Questions were then answered, after which the meeting adjourned to allow time during the remainder of the day for the group to travel to Oroville in preparation for the

*The basic project concept, which has been under study intermittently for about 8 years, was developed by Frank E. Bonner, consulting engineer of San Francisco, who serves the District in a consulting capacity.

when WATER threatens your time schedule...



...better get BARNES PUMPS on the job!



The toughest bailing out jobs you meet up with in building roads—and keeping excavation dry—give you much less trouble with high-capacity Barnes pumps that move more water, faster!

You'll bail as much as 90,000 gallons an hour with Barnes *self-priming* centrifugal pumps. Handle semi-solid seepage more swiftly, too, using Barnes heavy duty diaphragm pumps. Wide selection. Rugged construction. Many designed for low cost job-to-job portability. Be sure to get a free copy of our new Construction Pump Selector No. 238. It helps you match up the right Barnes pumps with any liquid-handling problem you meet!

Specify Barnes Blue Ribbon Quality

. . . it pays off!

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BARNES MANUFACTURING CO.,
MANSFIELD, OHIO Dept. G-29

5705-9

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SOME SITES were accessible on foot only. This group rests on way to Woodleaf Powerhouse site. Each group was accompanied by Bechtel personnel familiar with design, field exploration and geology. Evenings were devoted to question-and-answer sessions.

field inspection, which took place on the succeeding five days.

Trips to the sites

As has been indicated, the project lies in rugged terrain. Some sites are accessible by automobile over fair to poor roads and trails, some by four-wheel drive vehicle and a few only by relatively difficult climbs into and out of canyons on foot. In establishing the sequence of the inspection, it was planned to concentrate on those sites which could be reached by wheeled vehicles during the first three days, leaving the more difficult foot trips for the last two days.

Since it was not known what the response of the contracting world would be to publicity for the prebidding inspection, considerable flexibility in arrangements was necessary. It was decided that each individual would be responsible for his own transportation except that Bechtel and the Oroville-Wyandotte Irrigation District would provide four- or six-wheel drive equipment where needed. Each individual was also responsible for his own food and lodging.

Because the maximum size of each party was limited due to the narrowness of roads and trails, provision was made for conducting one, two or three inspection parties simultaneously during the first three days, depending upon the total number participating. As it developed, over 100 individuals were at hand for the inspection, and it was necessary to utilize the maximum of three groups which had been planned. The itinerary of each group was scheduled in such a manner that, at the end of the third day, each would cover, without conflict with any other, the entire project except those portions which were accessible only on foot.

Detailed schedules, including estimated time of arrival at and departure from each project site were established in advance. Departure each morning was from a designated location in Oroville with return to the same location each evening. Each group was led by a bright yellow pickup truck to which a sign indicating the party's designation (A, B or C) had been attached. For those sites accessible only by four- or six-wheel drive vehicle, the groups proceeded as far as possible in standard vehicles, being met at pre-arranged destinations by the multi-wheel drive trucks to which they transferred for the remaining trip into the project site and return.

Bechtel personnel were selected so that at least one man familiar with design and one with field explorations and surveys would accompany each group. Group A was conducted by Thon, C. S. Content, staff geologist, D. C. Huss, resident engineer, and H. N. Ham, senior engineer. Group B was conducted by Buehler, H. E. Howe, assistant project engineer, and J. R. Jensen, field geologist. Group C was conducted by the writer and R. V. Core, assistant resident engineer, and M. F. Thiel, materials engineer. J. S. Connell and Charles Dorser, directors of the District, also participated in the guidance of the contractor representatives.

Each evening during the inspection, a question and answer period was held in the banquet room of the headquarters motel. During the first two evenings, discussion centered primarily around the legal and financial aspects of the project which differ somewhat from those normally encountered. The project will be constructed from proceeds of the sale of revenue bonds, which will be supported by annual payments for power generated by the project. The District and Pacific Gas and Electric Co. are currently negotiating terms of the contract under which PG&E will purchase the power. As a corollary to the financial arrangements, bids will be called on a guaranteed ceiling basis as well as on the normal unit price and quantity basis. At the remaining question and answer periods, the discussions centered primarily about the technical aspects of the project.

Odd forming problem solved with corrugated sheet steel

BARRETT Construction Co. used a unique method of backforming in pouring opposing walls of two adjacent buildings separated by only 8 in. of air space.

In constructing the new California State Building's extension at Golden Gate and Larkin streets in San Francisco, soil conditions made it necessary to divide the building into two separate structures by an 8-in. air space.

The problem Barrett faced was how to remove the back-up forms once the concrete walls were poured. Removal of conventional plywood forms proved to be extremely difficult, and they could not be left in place permanently since they would be subject to decay, leaving an undesirable condition between the two walls.

Instead of plywood, the contractor used corrugated steel sheet made by Curoco Manufacturing Co. of Albany, Calif. Called "Superspan," they are made from 26-gage galvanized sheets supplied through Bethlehem Pacific Coast Steel Corp.

Using Superspan as a back-up wall, the contractor could pour the concrete and leave the backwall in place as a permanent part of the building.

Sheets were first lapped together and fastened with extra long stove bolts which served to anchor them to the concrete. Rigidity was given the form by threaded steel rods fastened to steel flats running vertically along the form on 2 ft. centers. Cardboard sleeves on the rods permitted removal after the concrete had set.

BEAVERS—Fourth annual meeting

Banquet attended by record 1,040 and presided over by President Sawyer. Awards presented to eight for outstanding careers in construction.

WITH another record attendance, the Beavers held their fourth annual dinner meeting in Los Angeles, January 15 and honored eight men from the construction industry with Golden Beavers. Members and guests numbered 1,040 when they sat down to the annual banquet that was presided over by President John M. Sawyer, who is vice president, Macco Corporation. The Board of Directors held its annual meeting during the morning, followed by an informal buffet luncheon for members and guests.

The cocktail party preceding the dinner was an opportunity for renewal of friendships among construction men and their associates from all over the West. President Sawyer handed out the eight Awards, assisted by vice president R. F. Rasey. The 1959 Awards went to:

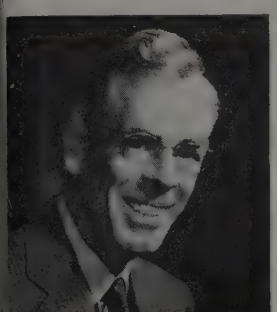
Management:	L. E. Dixon John MacLeod	**Supervision:**	H. E. Carleton O. S. McCormick
Engineering:	Charles P. Dunn L. J. Sverdrup	**Supply:** **Special:**	James L. Lovell Ben Moreell

L. E. Dixon

From a self-styled entry into the business "picking up nails", L. E. Dixon has grown to become one of the great builders of the West. His diverse talents are dedicated to the highest ideals of the construction industry and to the progress of our nation.

Born in Iowa and educated in Colorado, Mr. Dixon moved to Los Angeles in 1910. Soon after, at 18, he worked on the Pantages Theater as a laborer for Alta Planing Mills and at the same time attended night engineering classes. Eventually he became estimator for Alta.

His reputation as an estimator brought him a dual role as chief engineer and managing partner of Edwards & Wildey Company. A year later the firm name was changed to Edwards, Wildey & Dixon Company.



Los Angeles owes much to L. E. Dixon for, in addition to many height-limit buildings, his company erected the magnificent Los Angeles Memorial Coliseum, Hollywood Park Race Track, Deauville Beach Club and is presently constructing the Los Angeles Sports Arena.

However, he is being honored now for accomplishments known best to the heavy construction industry: his long record of major tunnel and dam construction projects. L.E.'s work for the Los Angeles Metropolitan Water District includes eleven miles of tunnels, La Verne Water Treatment Plant, and the Hayfield and Eagle Mountain Pumping Plants.

L. E. Dixon contributed heavily to the war effort by the construction of Camp San Luis Obispo and numerous other facilities.

BEAVER OFFICERS FOR 1959

President:
R. F. Rasey, President
Winston Brothers Co.

Sr. Vice Pres.:
Paul Grafe, Chairman of the Board
Grafe-Callahan Construction Co.

Vice President:
Edgar Kaiser, President
Henry J. Kaiser Co.

Sec.-Treas.:
J. P. Shirley, Jr., President
Gunther & Shirley Co.

Asst. Sec.-Treas.:
Jack Watson, J. W. Watson Co.

Ambassador of Goodwill:
James L. Lovell

In recent years, as head of L. E. Dixon Company, he has undertaken a number of projects for the U. S. Army Corps of Engineers. These include the Narrows Dam in Arkansas, Allatoona Dam in Georgia, Chief Joseph and Rocky Reach Dams in Washington.

L. E. Dixon is not a man to seek publicity. His accomplishments, however, identify him as a man whose integrity and ability is recognized throughout the construction world.

John MacLeod

John MacLeod is another of Management's men who have devoted their entire lives to the Industry—in peace and in war.

John was born in Inverness-shire, Scotland, and left the Highlands for Canada in 1912. After ten years of hard work he rose to the position of general superintendent of the Canadian Pacific Railroad's Tie & Timber Department. This at the age of only 28.

Los Angeles called in 1923, and he was lured to the Southland by the offer of a superintendent's position with William Simpson.

Shortly thereafter, exhibiting the drive which was to characterize his whole career, he organized Macco Corporation and located his offices at Paramount, then the center of Southern California's oil fields.

In 1932, during the worst of the depression, John plunged into the heavy construction field. A successful joint venture for construction of San Gabriel Dam Number 2 was quickly followed by numerous major projects.

During World War II, Macco built dry docks at Bremerton, amphibious facilities at San Diego, air bases, and other military installations with such efficiency that the company was twice awarded the Army-Navy "E".

John has served as National President of the Associated General Contractors and is currently on the National Advisory Committee and National Finance Committee of that organization.

The Beavers are proud to honor John MacLeod for his devotion to duty, not only because of the respect in which he is held by his colleagues but because he was one of the founders of the Beavers.

H. E. Carleton

H. E. Carleton typifies the hard-driving, resourceful supervision which has enabled the Industry to move steadily toward its goal of a bigger and better America.

Born in 1879 in Waseca, Minnesota, Harry attended St. Thomas College but soon adopted Montana as his home state. There he devoted many of his more than fifty years in construction work to the growth of the Industry in that rugged area.

His first job in the construction field was a short period as rod-man for the Great Northern Railway, followed by two years as time-keeper and foreman with A. Guthrie & Company. Already he was showing the ambition and ingenuity which were to become a trademark of his long and distinguished career, for by 1906 he had accumulated a small number of teams and dirt moving equipment. With these, he secured his first sub-contract from Stewart and Welch.

Later, while associated with Foley Brothers—Welch and Stewart on Canadian railway construction, Harry gained his first experience with tunnels. This was to become his major activity for many years.

In 1927, he was appointed general superintendent of the newly formed West Construction Company, a post he held until promoted to president.

When the West Construction Company was sold to Morrison-Knudsen Company, Harry planned to retire, but reconsidered and accepted the responsibility of supervising construction of the Union Pacific Railway's Aspen tunnel. He then joined the A. M. Coker Construction Company as vice-president, which position he still holds at the age of four score years.

O. S. McCormick

As an imaginative construction supervisor of tremendous vitality and brilliant organizational ability, Oscar S. McCornick holds the dignity and safety of his fellow men above speed, profit or personal acclaim.

McCormick was born on a North Dakota farm, August 26, 1890. When he was six, his family moved to Sandstone, Minnesota, where his father entered the small construction field and where Oscar gained experience helping his father during summer vacations.

Later, he became foreman and eventually superintendent of construction on Indian reservations.

In 1930, he joined the Al Johnson Construction Co. of which he is now vice-president. During this association he has supervised river dredging, deep foundation work, dam and tunnel construction.

During World War II, McCormick had charge of all building construction on the Burlington Ordnance Plant in Iowa, and, during 1941 and 1942, managed all of the Corps of Engineers' projects in Newfoundland.

At present, he is simultaneously managing construction of powerhouse, dam, and highway bridge jobs. In the words of V. A. Johnson, president of Al Johnson Construction Co., Oscar McCormick "has personally supervised the construction of all of our larger projects. He is notable for the amount of drive and ingenuity with which he pursues his work and has outstanding organizational ability."

Charles P. Dunn

Charles P. Dunn, ASCE, is known around-the-world for a wide variety of engineering achievements on land and sea.

A native of Ohio, Dunn was born in the town of Marcus on September 28, 1886, and graduated from Washington State College in 1909. Thereafter, he spent ten years gaining valuable experience in widely different fields ranging from hydroelectric surveys through railway maintenance, electrification of tunnels, street improvement, and land surveys to ship design.

With this solid background, Dunn acquired a reputation between 1919 and 1922 for hydroelectric design on such famous projects as the Skagit River Development, and the Gorge, Diablo and Ross Dams. This led to positions as chief engineer with the Portland Electric Power Company and later with Alcoa Power Company.

For a year, starting in 1931, he was superintendent of construction on Madden Dam, Panama Canal Zone, then for two years construction engineer on piers for the San Francisco-Oakland Bay Bridge.

Since 1934, Dunn has held various positions with Morrison-Knudsen Company and its subsidiaries. While chief engineer, he designed the U. S. Navy's underground fuel tanks at Pearl Harbor.

Now, among other positions, he is vice president and director of Morrison-Knudsen, a post to which he was appointed in 1942. In 1945 he initiated and organized Morrison-Knudsen International, Morrison-Knudsen Afghanistan and other subsidiaries.

Throughout his far-ranging travels Charles P. Dunn has brought great credit to the United States, while giving the world the advantages of American techniques and skills. For this he richly deserves what honors the Beavers can bestow.

L. J. Sverdrup

General L. J. Sverdrup, AICE, ASCE, SAME, AREA, is a brilliant engineer and a man who has served his adopted country with honor through times of peace and war.

Born in Sulen, Norway, on January 11, 1898, he came to the United States in 1914 and graduated from the University of Minnesota in 1921. After grad-

uation, Sverdrup spent a year with the Minnesota State Highway Department and six years with the Missouri State Highway Department. He became chief bridge engineer of the latter and assistant to the chief engineer.

In 1928, he joined his former professor at the University of Minnesota, John I. Parcel, in a consulting engineering partnership. The several companies of which Sverdrup is now president are outgrowths of that partnership.

From this point, it becomes impossible to more than touch on a very few of the multitude of honors bestowed on this soldier-engineer by governments and universities, or even to list his achievements in civilian, military, and diplomatic fields.

At the outbreak of World War II, civilian L. J. Sverdrup was in the Pacific, supervising construction of a chain of air bases which his company designed under contract with the U. S. Army Corps of Engineers. Suddenly, in 1942, he was a Colonel in the Corps of Engineers and by 1945 a Major General.

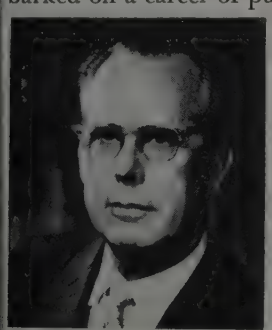
During the Leyte and Luzon invasions of the Philippines, General Sverdrup was Acting Chief Engineer of the Engineer Construction Command in the Southwest Pacific. He was responsible for building 200 airstrips and airfields as well as numerous military roads, bridges, hospitals, docks, and other installations.

Among his decorations are the Distinguished Service Cross, Distinguished Service Medal with Oak Leaf Cluster, Silver Star, Legion of Merit, Purple Heart, and four foreign decorations.

James L. Lovell

A founder of the Beavers, James L. Lovell was born on a farm in Robertson County, Tennessee, in 1896, and is a deeply religious man who inspires faith and trust in all who know him. Jimmie, as he is affectionately known to his friends, entered Vanderbilt University in 1917 but left immediately to serve his country in World War I.

Returning to the farm in 1919, Jimmie soon embarked on a career of public office in a sincere desire to uphold the Constitution for which he had fought. He served as Chief of Police of Portland, Tennessee, and Under-Sheriff of Sumner County. Within three years he had fairly well cleared the county of illicit stills and then joined the Dupont Company.



Although his first job for Dupont was as a professional firearms shooter, he was assigned to underground ventilation in 1927. From then until 1935, Jimmie covered most of the mine and tunnel jobs in North America as an expert on ventilation problems.

He made so many friends among the contractors that Dupont transferred him to the Explosives Department as western representative in the Contractors Section. This is the position he holds today.

Jimmie's first love is the Church. For more than twenty years he has edited and published religious journals. He is a trustee of Pepperdine College and does much to help deserving youngsters receive an education. Next to his church, his greatest affection is for those in the construction industry.

The respect in which he is held is best expressed by Steve Bechtel when he says, "Jimmie Lovell is a dedicated person, and those of us who have known him throughout the years admire and respect him not only for what he has done for the construction industry but for his ideals and character."

Jimmie Lovell, through the highest devotion, has brought great credit to his country, his church, the Industry, and the Beaver organization which is so proud to present this fitting award.

Ben Moreell

Admiral Ben Moreell, winner of this year's Beaver Award under the Special Category, is a very special man whose career exemplifies the accomplishments and devotion so prominent in leaders of the heavy construction industry.

Born in Salt Lake City, Utah, in September of 1892, he received his BS from Washington University, St. Louis, in 1913. Following a four-year assignment as resident engineer on construction projects in the City of St. Louis, he entered the Navy in 1917.

From then on, he rose through one major executive engineering office after another until—already a Rear Admiral—he was appointed Chief of the Bureau of Yards and Docks and Chief of the Engineers of the U. S. Navy.

In 1941, Admiral Moreell, with characteristic initiative, organized the Sea Bees and pushed them from nothing to a mighty force of 10,000 officers and 240,000 men. Their motto "CAN DO" typifies the attitude of Ben Moreell in overcoming seemingly impossible situations. By war's end, he had directed a ten billion dollar construction program of building up shore establishments to support the fleet.

In recognition of his work for the Navy, Admiral Moreell was awarded the Distinguished Service Medal with Gold Star; the Legion of Merit; the Order of the British Empire, Military Branch, Rank of Commander; and the Medal of Honor and Merit from the Republic of Haiti.

His civilian career has been no less distinguished. He holds the John Fritz Medal, Wason Medal, Henry C. Turner Gold Medal, the Moles Annual Award, and holds honorary membership in many technical societies (He has been president of several); and he was chosen "Pittsburgh Man of the Year" in 1951 for launching a $500,000,000 expansion program at Jones & Laughlin Steel Corporation which added impetus to plans for the redevelopment of Pittsburgh, Pennsylvania. Then president, he is now chairman of the board and chief executive officer of J & L Steel.

"151,000 MILES WITHOUT A MAJOR OVERHAUL!"

says Clarence F. Guthrie
Canonsburg, Pa.

"Ford's 332-cu. in. V-8 is the hottest thing on the road for its size!

"Our fourteen Ford trucks all have exceptional durability records. Several '55 T-800 dumps, grossing 48,000 lb., have over 200,000 miles on 'em. They went an average of 150,000 miles before we touched the engine. And for power and performance, too, the Ford 332 engine is the hottest thing on the road for its size.

"Ford's better visibility, handling ease and power steering are big factors in our excellent highway safety record. We've had many million-mile accident-free years with our Ford fleet.

"In addition to our sand and gravel business, we have ten Ford F- and C-800 tractors that make long, over-the-road trips hauling limestone one way and steel on the way back.

"On these trips parts availability is very important. Ford Dealers are about everywhere, and they all stock parts. We never get delayed waiting for Ford parts."

GO FORD-WARD for savings with '59 Ford Trucks!

Whatever your job . . . wherever you do it—you'll find Ford Heavies and Extra Heavies are engineered and built to do it better! And the '59 improvements in these models will bring still more benefits to your operation.

Greater operating economy with new, faster rear axle ratios and wider choice of transmissions.

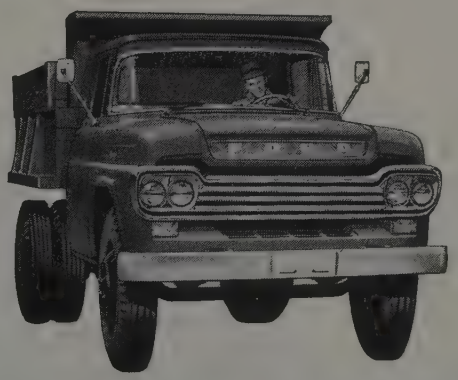
Higher payloads and longer axle life with new, higher-capacity front and rear axle options for most models.

Factory installed tractor package custom-fitted to Ford trucks for safer, more dependable braking.

More efficient parking brake of the internal expanding type has approximately 50% greater stopping and holding ability, requires less than half the operating effort needed for the previously used type.

Yes, the new '59 Ford trucks are here to take you *Ford*-ward for savings, *Ford*-ward for modern style and stamina.

See your Ford Dealer today!



NEW '59 FORD F-600 DUMP carries a maximum GVW rating of 19,500 lb. Now available with optional 6000-lb. front axle for greater capacity, longer life.

FORD TRUCKS COST LESS

LESS TO OWN . . . LESS TO RUN . . . LAST LONGER, TOO!

. . . for more details, circle No. 30 on Reader Service Postcard

Tellurometer surveying aids county engineering

Modern method using micro-wave signal between stations cuts engineering time and costs in Orange County. System used for both highway and flood-control projects.

A DRAMATIC story of how a new surveying technique is hastening construction projects to the contract stage is unfolding in Orange County, California. Engineers in this fast-growing area have turned to electronics to slash weeks off the preliminary engineering work required for location and decision of highways, flood control and sanitation projects. County Road Commissioner A. L. Koch claims the new method is not only hastening completion of this initial step toward construction but is reducing the cost of surveying by thousands of dollars.

Working with Pacific Air Industries, a Long Beach photogrammetry organization, the county has specified that mapping for two new projects—a highway re-location project and a flood-control job—be accomplished by aerial photogrammetry. The engineers also requested that the new "Tellurometer" system of distance-measuring by means of electronic waves be utilized in establishing ground controls. P.A.I. assigned this latter highly specialized aspect of the engineering job to Aerial Controls, Inc., of Woodland Hills, Calif.

When the maps were completed, weeks in advance of what might have been expected by the traditional methods, county engineers were highly pleased.

The highway project was particularly urgent. The county wanted relocation of a 22-mi. stretch of two-lane highway to qualify for federal-aid emergency funds. Maps and design plans were necessary for approval and the deadline was impending. By usual mapping methods, these operations would have taken considerable time. The route was through alternately rough and rolling terrain, heavily wooded in places. The county decided to take to the air for the engineering job and called upon Pacific Air Industries to fly and photograph the route and produce the maps photogrammetrically. The photogrammetry firm, in turn, asked for permission to try the Tellurometer system for establishing the necessary horizontal ground controls.

This combination produced a time-saving of several weeks and according to Commissioner Koch, resulted in greater accuracies. This is a feature which construction contractors can appreciate when they move onto the job.

The other project on which the Tellurometer was employed was for location of a new flood control channel. The 20-mi. ditch had to be planned down the most economical route through a series of highly built-up areas. Maps and photographs were needed quickly in order to facilitate right-of-way acquisition so a contract could be awarded without delay. Again, Pacific Air Industries and Aerial Controls, Inc., teamed up to tackle the job. Aeriel Controls ran a precise ground control traverse through the area, and PAI flew the band and produced the maps. "By specifying these techniques, we saved at least a year in this preliminary engineering operation," reported George Osborn, commissioner of the Orange County Flood Control District.

The completed channel will carry excessive run-off from the areas it penetrates to the ocean. Right-of-way required ranges from 40 ft. at the upper end to 180 ft. at the outlet, with about 25 ft. of this width needed for a service road. The maps specified covered a band up to 1,200 ft. wide on which county engineers could study drainage patterns and fix exact location of the ditch and its numerous inlets.

CALLING OFF readings from the instrument panel of the Tellurometer is Dick Estabrook, chief of surveys, Orange County, while Owen Vineyard, deputy county surveyor, takes notes. The new system of surveying is being used to speed up a county-wide mapping program. About 10 to 15 min. are required to unpack and set up this master unit over a known point (note plumb bob) while the remote unit is set up at a point to be observed. Only 10 min. are required to obtain the measurement.

The procedure with Tellurometer

Because the Tellurometer system of distance-measurement by microwaves is still the only electronics system in existence, only a relatively few engineers have had opportunity to observe it in operation. The electronic principles upon which it operates, however, are not complex.

One party member sets up a master unit directly over one point while another crew man sets up a remote unit at the other station to be observed. It takes each one about 10 to 15 min. to unpack and mount his unit on a tripod.

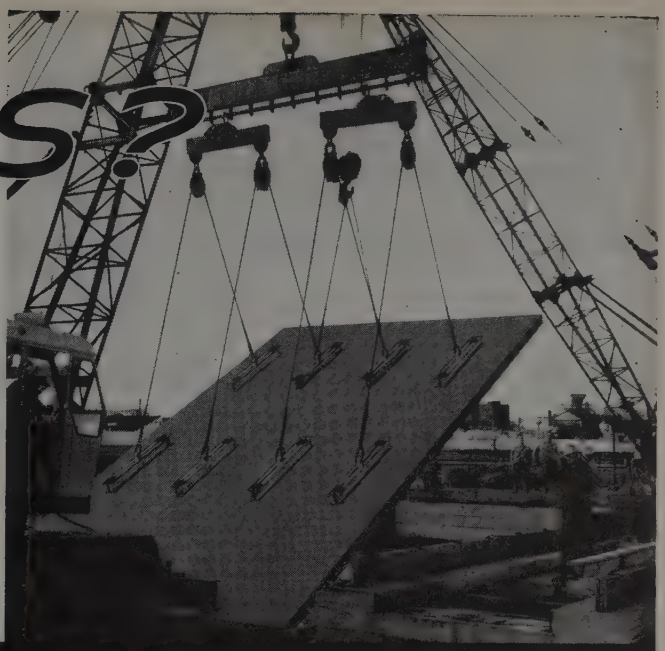
They then establish contact us-

(Continued on page 84)

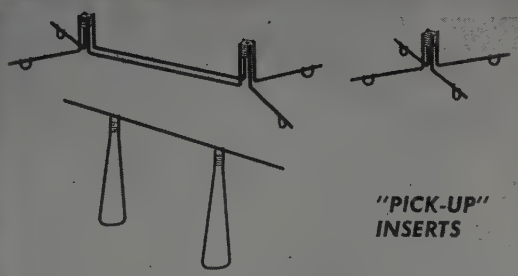
PLANNING TILT-UPS?

From original layouts to final positioning...

SUPERIOR



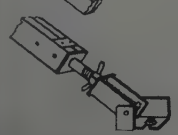
HAS THE ACCESSORIES AND THE SYSTEM



"PICK-UP" INSERTS

ANCHORS FOR BRACES

STRESS EQUALIZER



ADJUSTABLE BRACE

PLANNING AND LAYOUT SERVICE

Tilt-Up jobs can be accomplished faster and with greater efficiency by using SUPERIOR Accessories (shown at left). In addition to Accessories which have been used and proven on thousands of conventional as well as unusual projects in this field, SUPERIOR also provides the *system* for the entire job, from original planning and layouts, to the final positioning of the precast panels with Superior Adjustable Braces.

As the pioneer in this field, Superior has recently developed a special Stress Equalizer for reducing lifting stress in tilt-up panels of over 20 ft. high. It offers two advantages: (1) Less concrete reinforcing steel is required for stresses which occur at time of lift; (2) Permits use of simplified crane rigging.

On your next tilt-up job, avoid expensive crane delays, be assured of safety, and reduce overall costs! Specify the SUPERIOR System.

For details request a copy of Bulletin TU-3.

(Shown above) 67,000 LB. PRECAST PANEL being positioned. 19' 6" wide by 35' high by 8" thick. Swinerton & Walberg of San Francisco is the contractor.

SUPERIOR Concrete Accessories, Inc., 9301 King St., Franklin Park, Ill.
(A Suburb of Chicago)

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1775 Broadway, N.Y. 19, N.Y.

HOUSTON OFFICE
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PACIFIC COAST PLANT
2100 Williams St., San Leandro, Calif.

... for more details, circle No. 31 on Reader Service Postcard

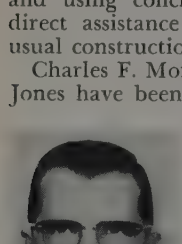
New offices in Portland and San Francisco

PCA expands Western service

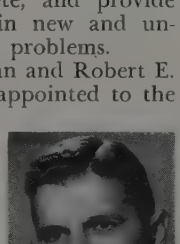
THE PORTLAND CEMENT ASSOCIATION, national clearing-house organization for concrete construction information, began field service activities in Northern California, northern Nevada, and Oregon the first of this year. A new office has been established in San Francisco to carry on activities in Northern California and Nevada. Field work in Oregon will be under the direction of the Association's Seattle district office.

Extension of Portland Cement Association activities is an important development to the construction industry in these areas. It will enable the association to make available to cement users in the new areas the assistance of engineers skilled in all types of concrete construction and the latest information on uses of cement and concrete, as well as new design methods and results of research and development work carried on by the association. The new office will also distribute the association's many publications on design and construction of concrete structures, conduct courses of instruction on various technical aspects of making and using concrete, and provide direct assistance in new and unusual construction problems.

Charles F. Moran and Robert E. Jones have been appointed to the



MORAN



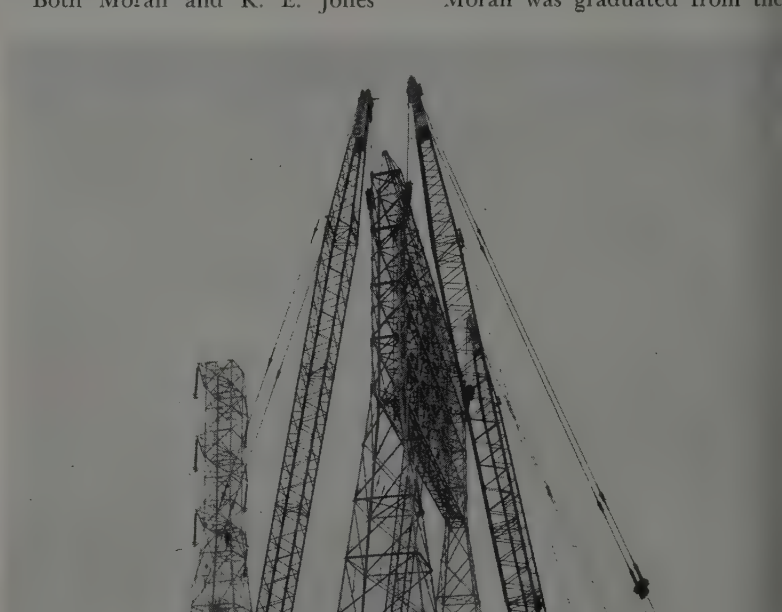
R. JONES

newly established San Francisco office, and a third civil engineer, H. Allen Johnson, will begin duties this month. Moran is structural engineering specialist, and Jones fills the position of paving and general field engineer. The new office is located in the Russ Building at 235 Montgomery St.

Byron E. Jones, formerly of the Los Angeles office staff, has been appointed paving and general field engineer in Oregon, with headquarters in Portland.

Both Moran and R. E. Jones have been members of the Los Angeles district office staff of the PCA for the past six years. Moran joined the association staff in 1953 as a field engineer in Riverside-San Bernardino counties and in 1956 was made structural specialist in the Los Angeles district office, covering Southern California, southeastern Nevada, and Arizona. Prior to 1953, he was employed by the Los Angeles County Department of Building and Safety and was in the bridge division of the Los Angeles County Road Department.

Moran was graduated from the



FOUR CRANES MOVE TOWER WITH "HOT" LINES

Four cranes from the Owl Truck & Construction Co. lifted and moved a transmission tower of the Southern California Edison Co., with 12 of the lines energized at 66,000 volts. The tower was moved 71 ft. to make way for an interchange structure on a freeway.

The cranes picked up the 48,000-lb. tower and completed the move in about 3 hr. Twelve of the 18 high tension lines were kept in service during the operation since they formed an important source of power in the Long Beach Area. This was the first move of its kind made by the utility and details were worked out with the most accurate precision during almost a year of planning. With the load attached to the 110-ft. booms the cranes inched their way to the new site.

University of California at Berkeley in 1948. He is a licensed civil engineer in California and belongs to the California Structural Engineers Association and the American Concrete Institute.

Jones has been a field engineer in the Bakersfield area since joining the Portland Cement Association in 1953. Prior to joining the Association, he was with the Los Angeles County Road Department

Byron E. Jones

for three years. He is a graduate of Stanford University, 1949. Jones is a licensed civil engineer in California, a member of the American Concrete Institute, and the Engineers Club of Bakersfield.

Byron Jones, the representative in Oregon, has been a member of the Los Angeles District Office staff of PCA. He graduated from the University of Kansas in 1951. He was employed by the California Division of Highways for five years prior to joining the Association as general field engineer in the Los Angeles metropolitan area.

Jones is an Associate Member of the American Society of Civil Engineers and is a member of the Los Angeles City-County Engineers Association and the American Concrete Institute.

The Portland Cement Association is a national organization to improve and extend the uses of portland cement and concrete through scientific research, development, promotion, education and engineering field work. The association maintains 32 district and regional offices throughout the United States and Canada. The program of the association is made possible by the financial support of its 74 member companies, who manufacture a large proportion of all portland cement used in the U.S. and Canada.

The new areas of operation for PCA will be under the over-all direction of John M. McNerney, Western Regional Manager of the Association. McNerney, whose offices are in Los Angeles, directs the association's activities in California, Arizona, Nevada, Oregon, Washington, and in British Columbia, Canada.

Highway Conference scheduled for March 3-5

THE SECOND annual highway conference sponsored by the Civil Engineering Department of the College of the Pacific in Stockton, Calif., has been scheduled for March 3, 4, and 5. The conference was organized by Dean A. Diefendorf of the School of Engineering. Between 300 and 400 are expected to attend.

Papers will be delivered by acknowledged authorities in the fields of compaction, soils testing, asphalt, concrete, steel, aluminum, and others. The conference has been planned to allow time for questions from the floor following each speaker's presentation.

Of special interest this year is the program for Thursday morning, March 5, which was planned with the cooperation of the Northern and Central Chapter of the Associated General Contractors. A feature of this morning session will be a question and answer period with a panel composed of representatives from five construction firms.

Registration fee will be $3 per person. The complete program and details can be obtained by writing to Dean Diefendorf.

Pilot plant being built to convert sea water to fresh

SOUTHERN California Edison Co. has announced award of a contract for pilot plant equipment which will convert sea water to fresh water at its Mandalay Steam Generation plant now under construction near Oxnard, Calif. To cost more than $100,000, the saline water experimental equipment will be designed and furnished by the Cleaver-Brooks Special Products, Inc. Cost of the over-all project, including installation and experimental operation, will exceed $250,000. Cleaver-Brooks is currently building the sea water evaporator for the nation's first atomic-powered aircraft carrier, the new Enterprise.

Test work with the new equipment, which will produce approximately 100,000 gpd. is expected to begin near the end of next summer. The Mandalay station is scheduled to begin operation this spring.

Purpose of this experimental water conversion plant is to search out the methods of extracting potable water from sea water at as low a cost as possible. This pilot plant will be too small to freshen enough water for commercial use. Water from the plant will be used only to supply some of the fresh water needs of the Mandalay Steam Station.

ACI National Convention in Los Angeles Feb. 23-26

THE American Concrete Institute will hold its annual convention in Los Angeles, Feb. 23-26. Monday and Tuesday morning will be devoted to technical committee sessions with the first general convention session set for Tuesday afternoon. Technical sessions begin Wednesday with two sessions running concurrently through Thursday noon, followed by the annual research session that afternoon.

An added attraction is the student competition for concrete designs and applications sponsored by the ACI Southern California Chapter. The competition was open to all students in Southern California colleges regularly enrolled in engineering or architecture. Four cash awards will be given for the best presentations of projects using portland cement concrete and may be in the form of scale models, renderings, drawings, or pictorial presentations. Entries will be on display at the convention and prizes will be presented at the annual awards luncheon.

Colorado prepares for record highway season

THE Division of Surveys and Plans headed by Adolph Zulian has reported to the State Highway Department of Colorado that it is ready to call bids early in 1959 on 80 mi. of construction to cost about $9,000,000. This program includes plans for the largest single construction contract in Colorado state highway history—grading and structures on the four lanes of Interstate System US87 north of Colorado Springs, estimated to cost about $3,000,000.

Bids on four other large Interstate projects are also in progress: A $1,760,000 improvement of US6-40 east of Idaho Springs; building of two short one-way tunnels through a rocky promontory on this project estimated to cost about $1,000,000; a 7.7-mi. $1,450,000, 4-lane job on US87 south of Pueblo and a $1,500,000 interchange job and paving on US87 between Monument and Larkspur.

ALASKA Newsletter

By CLIFFORD S. CERNICK, Fairbanks

EMPLOYMENT UP — Employment in the new state of Alaska already is showing a significant increase. As an example, at Christmas, employment in the Fairbanks area was one-fifth above the figure for the previous Christmas. The estimated number of persons employed in the area was 10,140. This was 21% above the employment figure a year before, which was estimated at 8,360. Unemployment figures likewise showed an improvement in the job picture here. On Christmas Day, 1958, 12% of Fairbanks area workers were listed as unemployed. On Christmas of 1957 the figure was 16%. By categories the unemployed were as follows: 183 laborers, 137 carpenters, 77 truck drivers, 72 operating engineers, 57 miners, 51 cooks, 38 plumbers, 37 painters, 30 kitchen helpers, 26 oilers, 25 waitresses, and 20 sales clerks.

CLEAR WALKOUT — At year's end, the job of construction of an 810-man camp for the men who will work on the huge missile detection site at Clear had returned to work following a union dispute. Carpenters on the job walked out in mid-December because a subcontract had been let to a firm which had refused to sign a contract with the Building Trades Council. When the carpenters walked out, work came to a standstill until after the holidays. Terms of the agreement which led to a settlement of the dispute were not revealed; however, one source stated the contractor — Morrison-Knudsen—had agreed to take over the questioned subcontract and possibly relet it.

CLEAR BIDS — In February—and by the time this reaches print—bids will have been opened on more than $70,000,000 in construction at Clear. Items on which bids are to be opened include radar scanner buildings, antenna foundations, passageways, a power plant, clearing and grading, a fire alarm system, roads, a composite building, electronics maintenance shop and outside utilities. It is by far the biggest job to be called for bids in Alaska in many a month.

FRIENDLY WARNING— George W. Nourse, assistant district manager for Morrison-Knudsen at Clear has announced that the steady stream of visitors to the missile detection site there has caused a problem because of lack of housing facilities for any but those actually on the job. Nourse said visitors had been coming in by as many as 50 plane landings a day. He pointed out there was no taxicab service from the landing strip to the campsite some four miles away. "We're not set up for lodging and feeding visitors," said George Fowler, M-K's project manager at Clear. "We will, however, assist those having legitimate business at the site insofar as our facilities permit. Others will find no accommodations because the camp is big enough only for our own needs."

NO SNAKE BITE — Through a mix-up at one of the headquarters offices, a shipment of snake-bite kits arrived at the Fairbanks Dewline supply office for Federal Electric Corp. The snake-bite kits apparently were intended for distribution to remote Dewline stations in Alaska. Carl Calvin, morale and safety representative for the office, sent out this message to the Dewline office manager: "A survey of all sites relative to the incidence of snake bites has been completed. No bites have been recorded in the present era. The only report of any snakes along the Arctic Coast was reported by two Eskimos at Point Barrow in 1955. It was later discovered they had been consuming a liquid known as 'Dongnak'. The bites were treated by removing the 'Dongnak'. There are no reports of Ice-worm bites." Incidentally, Alaska is virtually free of snakes, so no construction man need carry a snake-bite kit or snake-bite medicine.

OIL DRUM PROBLEM—At remote construction sites in Alaska, the problem of what to do with empty oil drums is one that seems to have no solution. The General Service Division of the CAA in Alaska estimated there are several million discarded oil drums all over the 49th state, most of them abandoned and there for the taking. The question is: How can anyone get them out of the interior and sold for enough to make the project worthwhile? So far, nobody has come up with a solution to the Alaska oil drum problem.

ALASKA'S "ROLLING" HIGHWAYS — Driving along Alaska highways in certain sections, the traveller will come upon portions of roadbed that are similar in shape to modified roller coasters. The road deteriorates into a series of concave depressions. This is caused by permafrost conditions. Permafrost, which is ground that has been frozen for thousands of years, creates an unstable, gummy, waterlogged mass when it thaws and gives persistent headaches to Alaskan highway engineers. The effect of permafrost on roads is an uneven heaving and settling. Angelo F. Ghiglione, former Alaskan and an expert on permafrost problems, suggestes several solutions to road builders in areas plagued with this condition. These include: choosing of locations where the natural drainage pattern will not be greatly disturbed, avoiding excavations deep and narrow draining ditches and use of paving that has flexible qualities. Stripping too far in advance of grading has resulted in abandonment of entire sections of road. Another important factor is reshaping, fine grading and paving one or two years after grading. This, says Ghiglione, will save costly pavement removal and replacement and provide a better travel surface. (Alaska has about 4,000 mi of roads and streets. An ambitious program of road building is now being planned for the 49th state with the exact scope still unrevealed. It is known, however, that arrival of statehood has greatly accelerated progress on these plans.

UNION DISCIPLINE — Disharmony in one Alaskan union has caused the first recorded instance here of "discipline by removal." George A. Mulkey, representative for the International Brotherhood of Electrical Workers, has reported that the Fairbanks Local of the union will be under the jurisdiction of the Anchorage local. The action was taken, according to Mulkey, "as a disciplinary action." He implied the action was taken because of illegal hiring and lack of cooperation on the part of the local with international headquarters. Anchorage headquarters, Mulkey pointed out, had been selected to have jurisdiction over the Fairbanks local because the Anchorage union contained about two-thirds of the total Alaska membership and the union cooperated with the International. Fairbanks businessmen feared the move might affect the economy of the city since it was rumored that hiring for the

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▲ **$45 MILLION NUCLEAR POWER PLANT** gets the best in portable heat from Herman Nelson units. Located 50 miles southwest of Chicago, the plant is being built by General Electric for Commonwealth Edison and six other large utilities. Bechtel Corp. is the engineer-constructor. Heaters are in use 24 hours a day, seven days a week, for curing concrete.

◀ **15° BELOW ZERO** kept Herman Nelson heaters at work supplying safe heat for building the Sparrow Hospital annex, Lansing, Mich. Contractor is Reniger Construction Company.

◀ **DRYING OUT BIG MOTORS,** preheating and thawing equipment, are jobs that call for safe Herman Nelson Portable Heaters at Penn-Dixie Cement's West Des Moines plant.

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esno, Calif.	Edward R. Bacon Co.	Grand Junction, Colorado	Western Machinery Co.
akland, Calif.	Edward R. Bacon Co.	Spokane, Washington	Western Machinery Co.
cramento, Calif.	Edward R. Bacon Co.	Billings, Montana	Montana Power & Equipment Co.
attle, Wash.	A. H. Cox & Co.	Helena, Montana	Montana Power & Equipment Co.
erett, Wash.	A. H. Cox & Co.	Reno, Nevada	Sierra Machinery Co., Inc.

. . . for more details, circle No. 33 on Reader Service Postcard

Clear construction job would be out of Anchorage under the new set-up. This was denied by Mulkey, who said hiring privileges still would be retained by the Fairbanks local. A number of Fairbanks electrical contractors expressed themselves in favor of the move, but the rank and file of the Fairbanks union unanimously opposed it. Mulkey said the move would be carried out despite this opposition on the part of the members.

CONSTRUCTION NEWS NUGGETS—Biggest influx of tourists, job-seekers and businessmen is expected in new state during 1959. Officials in cities are beginning to worry about the problem of providing accommodations for all who are expected during the spring and summer. . . Early start to construction season is expected this year. . . Over 19,000 persons applied for work in Alaska employment offices during 1958. Of these, 6,700 were placed on jobs. . . Alaska's school construction pace during 1958 is barely keeping ahead of a booming student population. Some schools in Alaska are operating on double shifts. . . Intensive oil exploration activity in Alaska is anticipated during the coming year.

HAWAII Report

By ALAN GOODFADER, Honolulu

BOOM AND MORE BOOM — Construction was the outstanding growth factor in Hawaii in 1958 and appears headed for new highs this year. That was the opinion of James H. Shoemaker, Bank of Hawaii director of business research, in his December review of the Territory's business and economic conditions. In his preliminary review of business changes here during 1958, Shoemaker estimated that construction completed reached $170,000,000 this year. This compares with $137,000,000 last year, and $113,000,000 the year before. On Oahu, construction offset the effects of the Mainland depression and of the Territory's longest sugar strike. It served as a customer for such new Territory industries as cable rigging, corrugated pipe, corrugated iron, wire fencing and aluminum shingle fabricators. Apartment construction became a big factor in keeping the industry at record heights. A total of 2,090 apartment units were built during the first 10 months of the year. Business construction reached an estimated $40,000,000. Territorial and county construction and federal construction also accounted for large chunks of work. Shoemaker foresees "an outstanding business year" on Oahu in 1959 barring "unlikely developments" such as a prolonged strike, a sharp cutback in defense spending or the outbreak of war.

MORE CAPEHART — Construction already has received a major shot in the arm for 1959 with the authorization of the Defense Department of spending of $14,000,000 for 866 new Capehart housing units on Oahu. The new housing will boost the Army's housing facilities under construction on Oahu by 50%. Bids will be opened by the Army Engineers some time in April. At present, the armed forces have 4,368 Capehart units under construction. The new units will be at Ft. Shafter and Schofield Barracks.

SLIGHT DIP — Civilian construction activity dipped slightly on Oahu in November, according to the Honolulu Building Department. The department issued building permits for construction valued at $5,480,566, compared with more than $5,600,000 in October, and $5,800,000 in November, 1957. Slackening of institutional building accounted for the drop. The city is having a record year, however. Building through Nov. 30 showed 9,295 permits issued for construction valued at $92,500,000. Last year at the same time 9,252 permits had been issued for construction valued at $71,100,000.

HIGHWAY STUDY — The Territory is taking a new look at drivers' needs to determine where it should build its highways in the future. The last such traffic study is 10 years old. Interviewers will go house to house and will question drivers passing certain points on Oahu roads. The Federal government and Territory will share costs of the survey.

HOPES FOR FUNDS — William M. Wachter, Territorial highway engineer, returned recently from a meeting of the American Association of State Highway Officials with new hope that the Territory will be included in the U. S. Defense Highway system. Territory drivers pay taxes earmarked for the system but get no benefits from them. Wachter reported that the association adopted a resolution urging the Territory be included in the system. The association said a system of highways in the Territory is required for national defense purposes. With Wachter at the conference were Jack Myatt, deputy Territorial highway engineer; Albert C. Zane, advance planning engineer, and Quentin I. Smith, finance executive.

HOUSING PROJECT OKAYED — The Honolulu City Planning Commission has given the green light for a $15,000,000 public housing project in the Red Hill section of Oahu. The project will be built by the Hawaii Housing Authority. Construction will start by 1960, when Capehart demands on the industry have eased. The project will contain 117 buildings including duplexes and single-family dwellings. The development, within 3½ mi. of military work centers, is expected to cater mainly to employes in military installations.

BREAKWATER JOB—Army Engineers here are seeking funds to repair an estimated $500,000 in damage to the Kahului, Maui, harbor's east breakwater suffered in a recent storm. The storm opened a 75-ft. gap in the breakwater.

HARBOR GOING TOO — Bids were to be opened Jan. 15 on dredging of the inner entrance channel of Honolulu Harbor's second entrance channel project. The job includes dredging of some 4,440 ft. of channel and removal of 1,170,000 cu. ft. of coral. The Army Engineers' hopper dredge "Harding" will dredge the outer entrance. Work on a double bascule drawbridge is expected to start in the fall. Meanwhile, plans are shaping up for a Kahului Harbor dredging project. The Board of Engineers for Rivers and Harbors has approved a Honolulu district recommendation that the west end of the Kahului basin be dredged to a width of 600 ft. and a length of 2,400 ft. The job will cost about $974,700. The plan now needs the approval of the Chief of Engineers before going to Congress.

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Utah highway to open oil fields

SPURRED by discoveries of oil in the San Juan Basin, the State Road Commission of Utah is advancing plans to provide additional access into the Aneth Oil Fields of San Juan County. Programmed for construction early this year is an 80-ft. bridge and approaches across Montezuma Creek. This will provide a 2.3-mi. extension of SR-262 to link with existing north-south roads crossing the San Juan River in the Navajo Indian Reservation. The project was opened for bids in January. Total cost of construction is estimated at $250,000.

"The project is a continuation of State Road 262 which extends southeasterly towards Colorado from its point of junction with SR-47, 12 mi. south of Blanding," stated Elmo R. Morgan, Director of Highways. "The road will be on new alignment and will be a part of Utah's secondary system."

Industrial potential

Recognizing the industrial potential of oil discoveries in the Four Corners area, the state road commission took action to provide access roads into the oil fields. Last March bids were opened for a 10-mi. stretch of road easterly from a connection with SR-47. This contract was awarded to J. M. Sumsion & Sons of Springville, Utah, with a bid of $175,000. This project is now completed. The second phase was for a section of 9 mi. extending southeast. Low bidder for this portion of SR-262 was Harris Bethers & Bethers & Stoker Co., Salt Lake City, with a bid of $265,000. This project is now under construction. It is expected that final surfacing will be completed early this spring. These two projects will provide a two-lane, 24-ft. wide bituminous surfaced highway to the border of the Navajo Reservation, approximately 2 mi. west of the proposed site of Montezuma Bridge. When completed, the project will connect with an unimproved north-south road maintained by the Indian Service, extending north of the recently completed Navajo Bridge, over the San Juan River, in the heart of the reservation. The bridge was contracted with funds from private companies working in the area together with the U. S. Bureau of Indian Affairs. The bridge was dedicated with colorful ceremonies at the Four Corners last December.

Negotiations are under way with the State of Colorado for future extension of the Aneth Oil Field access road, to push the road eastward and link with Colorado in the vicinity of McElmo.

Financing problems key to Washington highway plans

WASHINGTON highway planning revolves about the financing problems for the next five years. Modernization of the Interstate highways in Washington during that period will require an estimated total of $1,335,000,000. An estimate prepared by the State Highway Commission indicates that available funds during the same period will be considerably short of this requirement. Financing required for this overall modernization program divides rather evenly between the Interstate System at about $630,000,000 and the primary and secondary state systems estimated at $675,000,000. Estimated funds have included all possible Federal aid, and the serious deficit remains.

Members of the Commission and the state legislative committee on highways recommends against further bond financing, because of the increased cost of debt servicing and the corresponding decline in funds available for active construction.

Oregon's highway contracts totaled 220 during 1958

OREGON established a new high for State Highway construction during 1958 exceeding $68,000,000 in contracts. This was compared to about $40,000,000 the previous year and $38,000,000 during 1953 which was the peak of the construction program made possible by a bond issue.

Of the contracts awarded during the last calendar year about $55,000,000 represent work which has not been completed at the present time and another $5,000,000 of contracts were scheduled for awarding last month.

Contracts during 1958 totaled 220, varying in size from about $10,000 to $3,350,000. Excavation work was an aggregate of about 37,000,000 cu. yd. Highway construction resulting from the bond issues authorized in 1951 and 1953 by the Oregon Legislature has been completed with one minor exception.

Dick Ellis watches Blaw-Knox Base Paver lay down six inch stone on a nine mile stretch of U. S. Route 27 between Stanford and Somerset, Kentucky.

"It's hard to believe there could be so much difference"

"We've been laying 3,000 tons of six inch material a day. The best we ever laid before in an eight hour day was 2,000 tons of No. 1 stone (4"-1½"). That was with two spreaders, too," reports Dick Ellis, superintendent for Corum and Edwards of Madisonville, Kentucky.

"This Blaw-Knox Base Paver handles a seven ton load in sixty seconds. Every 500 feet the base paver back-tracks and shifts for another pass. That gives us three passes at the 36-foot wide road bed. At intersections we take just ten minutes to adjust the box to 16 feet, and in a few more minutes the approaches are knocked out, putting the rig back on the main road," he adds.

Corum and Edwards, like contractors all over America are reaping the benefits of modern, high capacity machines like the Blaw-Knox Base Paver with its specifically engineered tractor and oscillating screed, to meet the demands of today's job—at a profit. Your Blaw-Knox distributor will be glad to give you full details on the Blaw-Knox Base Paver. Why not call him soon?

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Idaho road plans for 1959

DURING 1959 the Idaho Highway Department will undertake work on about 50 projects estimated to represent contracts totalling $40,000,000. This work will include jobs on Interstate, primary and secondary systems.

Money to be expended this year will be principally on the Interstate System, representing almost $28,000,000 as compared to about $9,000,000 on the state primary system and about $2,500,000 on secondary roads. Federal participation on the Interstate program will be almost $26,000,000 of this total.

Denver needs more water

DENVER proposes a $40,000,000 bond issue, which voters will be asked to approve next summer, to finance a long-range expansion of the city water supply. It will be a 40-year improvement program. Only 3 years ago Denver voters approved a $75,000,000 bond issue for the same purpose.

Low bids and contract awards

ARIZONA

M. M. Sundt Construction Co. of Tucson submitted a low bid of $1,031,798 for 5.3 mi. of grading, surfacing and construction of 4 bridges southeast of Tucson in Pima County. A low bid of $799,657 was submitted by **Tanner Bros., Inc.,** of Phoenix for 1.1 mi. of grading, and surfacing on U. S. Rte. 80, Benson-Douglas highway into city of Bisbee, Cochise County. A low bid of $478,909 was submitted by **Paul C. Helmick Co.,** Phoenix, for 6 mi. of grading and surfacing west of Theba on the Yuma-Casa Grande highway in Maricopa County. **Copper State Construction Co.,** Mesa, submitted two low bids for roadwork in Pinal and Cochise counties: a low bid of $475,117 for 5.3 mi. of grading and surfacing on State Rte. 84 on the Stanfield-Picacho highway in Pinal County, and $410,517 for 5 mi. of grading and surfacing on U. S. Route 80, Benson-Douglas highway, southeast of Benson in Cochise County. **Southern Arizona Contracting Co.** of Tucson submitted a low bid of $283,592 for grading, surfacing and construction of 4 underpasses and related work on the Benson-Steins Pass highway east of Wilcox in Cochise County.

CALIFORNIA

Griffith Company of Los Angeles received two contracts for roadwork in Kern and San Diego counties: a $5,465,760 contract for grading and paving 11.9 mi. on U. S. Highway 466, east of Bakersfield and construction of 4 bridges in Kern County; and a $2,564,776 contract for grading, surfacing and construction of 3 bridges on 2.6 mi. of U. S. 80 in city of San Diego. **Sierra Construction Co.** of Merced submitted a low bid of $815,237 for earthwork, structures and relocation of the Trinity County road, Stoney Creek to Ridgeville, Trinity River Division, Central Valley Project. **Engstrum & Nourse,** San Francisco, received a $1,631,700 contract for the general work on construction of two 6-story residence halls at San Francisco State College. **Wells Benz, Inc.** of San Diego received a $4,648,015 contract for Launch Complex No. 1, Naval Missile Facility, Point Arguello, Lompoc. **Cox Bros. Construction Co.** of Stanton received a $232,500 contract for construction of Bear Creek Canyon road and utilities, Naval Missile Facility, Point Arguello, Lompoc. A $1,076,100 contract was received by **Manderbach Construction Co.** of Glendale for construction of Component Test Building and Utilities, Naval Air Missile Test Center, Point Mugu. **W. F. Maxwell Co.,** Fontana, received a $1,038,550 contract for grading, surfacing and 7 separation structures and pumping plant to be constructed in city and county of Riverside. **Johnson, Drake & Piper, Inc.** of Oakland received a $7,844,000 contract for the general work on the new California Men's Colony at Los Padres in San Luis Obispo County. **Fisher & Stokes Construction Co.,** San Gabriel, submitted a low bid of $969,247 for construction of one bridge, grading and surfacing in city and county of Monterey. **Stolte, Inc.** of Oakland received a $344,451 contract for grading, surfacing and one concrete deck bridge across the Sacramento River in Broderick, Yolo County. A $180,756 contract was received by **Baun Construction Co., Inc.** of Fresno for 1.7 mi. of grading and surfacing on the Hearst San Simeon State Historical Monument road in San Luis Obispo County.

COLORADO

Bud King Construction Co. of Missoula, Mont., received a $3,167,176 contract for construction of Paonia Dam and relocation of state highway, Colorado River Storage Project, Colorado Paonia Participating Project. A low bid of $685,409 was submitted by **Latimer Construction Co.,** Denver, for construction of Valley Highway storm sewer in Denver County. **H. E. Lowdermilk Co.** of Englewood submitted a low bid of $615,529 for grading, surfacing, and structures on 5.8 mi. between Dove Creek and Cahone on State Highway 10 in Dolores County. **Shore-Bailey Construction Co.** of Littleton submitted a low bid of $229,797 for construction of bridge and approaches between Ft. Morgan and Brush in Morgan County. **Siegrist Construction Co.,** Denver, submitted a low bid of $222,417 for grading and surfacing on S. H. 92 in Montrose County.

IDAHO

James Reid of Salt Lake City, Utah, received a $1,281,999 contract for grading, surfacing and 3 underpasses on 7.8 mi. of U. S. Highway 15 in Jefferson County. **H. K. Ferguson Co.** of San Francisco, Calif. received a $1,000,000 contract for additions to existing utilities, structures, buildings, and a cooling loop at the Engineering Test Reactor area, Arco. A $521,601 contract was received by **Lonnie Smith** of Twin Falls for constructing one underpass, 2 bridges and 4 overpasses on Highways 15W and 80N, Snake River, Raft River in Cassia County. **Morrison-Knudsen Co., Inc.,** and **Duffy Reed** of Boise received a $1,279,274 contract for constructing a 4-lane divided roadway, one overpass and one underpass on U. S. 30 and U. S. 95 in Payette County.

NEW MEXICO

Brown Construction Co. of Albuquerque received a $1,927,452 contract for 14.4 mi. of grading, structures and surfacing on the Road Forks-East and West road in Hidalgo County. A $716,676 contract was received by **Skousen Construction Co., Skousen-Hise Contracting Co.** and **C. F. Chapel Contracting Co.** of Albuquerque for 1.4 mi. of grading, structures and surfacing on the Santa Rosa-East and West road in Guadalupe County. **Armstrong Construction Co., Inc.,** Roswell, received a $593,093

(Continued on page 82)

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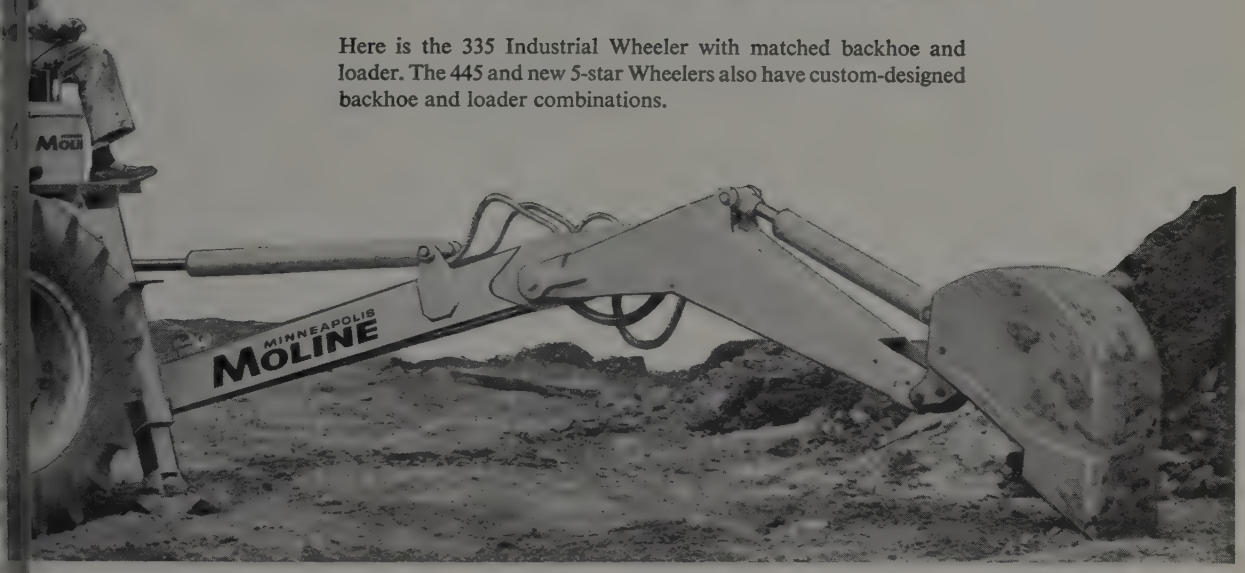

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Low bids and contract awards

(Continued from page 78)

contract for 5.5 mi. of grading, surfacing and related work on U. S. 70-380, west of Roswell in Lincoln and Chaves counties. **J. H. Marshall** of Clovis received a $549,795 contract for 11.2 mi. of grading, and surfacing on the Claud-North road in Curry County. A $437,759 contract was received by **Henry Thygesen & Co.** of Albuquerque for grading, structures and surfacing on 7.3 mi. of the Golden-South and Spur road toward San Pedro in Sandoval and Santa Fe counties. **Allison & Haney, Inc.** and **Daniels Construction Co.** of Albuquerque received a $389,920 contract for structures, grading and surfacing on 10.3 mi. of the Y-O crossing-north on S. R. 13 in Chaves County.

OREGON

Warren Northwest, Inc., Portland, received a $1,507,104 contract for grading and paving 11.2 mi. of the Lebanon road-Halsey Interchange section of the Pacific Highway, south of Albany in Linn County. **Babler Bros., Inc.,** of Portland, received a $148,348 contract for grading and paving in city of Bend, Deschutes County.

UTAH

Gibbons & Reed Co. of Salt Lake City submitted two low bids for roadwork in Salt Lake County: a low bid of $1,642,480 for construction of Interstate Highway 15 in city and county of Salt Lake; and $116,292 for grading and surfacing between 48th South and 78th South. A low bid of $201,550 was submitted by **J. M. Sumsion & Sons** of Springville for grading, surfacing and one structure north of Monticello in San Juan County.

WASHINGTON

Scarsella Bros., Inc., and **Scarsella Equipment Co.** of Seattle received a $1,175,350 contract for grading, structures and surfacing on 6.6 mi. of State Highway 2, Auburn to Soos Creek in King County. A $508,855 contract was received by **General Construction Co.** of Seattle for construction of the Hood Canal Bridge, Unit 2, approach structure in Jefferson and Kitsap counties. **Snitily Bros. Construction Co.** of Wenatchee received a $506,216 contract to build 2 bridges across the Entiat River, near the Rocky Reach Dam project in Chelan County. **Puget-Neukirch** of Seattle received a $370,033 contract for a traffic separation bridge in Auburn, and a bridge across the Green River, both for the Echo Lake branch of State Highway 2 in King County. **Henry J. Kaiser Co.** as sponsor and **Raymond International, Inc.,** received a contract for construction of the $8,800,000 Howard A. Hanson Dam southeast of Seattle, Green River, King County.

WYOMING

Woodward Construction Co., Rock Springs, received two contracts for roadwork in Sweetwater County: a $579,795 contract for grading, structure and surfacing 4.1 mi. of 4-lane divided highway on the Rock Springs - Rawlins road; and $159,858 for 7.9 mi. of grading, surfacing and related work on the Hiawatha road. **Forgey Bros. Co.** of Casper received a $579,365 contract for 6 mi. of grading, surfacing and related wo k on the Diversion Dam-Riverton road in Fremont County. A $474,239 contract was received by **Platte Valley Construction Co.** of Grand Island, Nebr., for 3.5 mi. of grading and surfacing on 4-lane divided highway in Crook County. **Asbell Bros. Construction Co.** of Riverton received a $370,579 contract for grading and surfacing on the Sheridan-Ranchester road in Sheridan County. **Riedesel-Lowe Co.** of Cheyenne received a $302,103 contract for 7 structures on the Rock Springs-Rawlins road in Sweetwater County. **Etlin E. Peterson** of Casper received 2 contracts for roadwork in Fremont and Carbon counties: a $284,799 contract for construction of one bridge over the Wind River on the Diversion Dam - Riverton road in Fremont County; and $127,095 for 2 bridges over Medicine Bow River and Little Medicine Bow River and related work on 2.6 mi. of the Bates Creek - Medicine Bow road in Carbon County. A $247,286 contract was received by **Charles M. Smith,** Thermopolis, for construction of one bridge over Clark Fork River and miscellaneous work on 9 mi. of the Cody-Clark Fork road in Park County. **Husman Bros. Inc.** of Sheridan received a $243,913 contract for one bridge and approaches over Big Goose Creek in Sheridan County. A $168,662 contract was received by **Sims Construction Co.,** Lander, for 2.6 mi. of grading and surfacing the Bates Creek-Medicine Bow road in Carbon County.

Introducing-DAVIS "99" Economy Loader

New Low Price–with Famous Davis Quality

The Davis Backhoe

The Davis Backhoe has more utility than any other backhoe. It handles jobs once assigned to larger, more expensive machines — and it is the first backhoe ever to dig flush alongside buildings, fences, or other obstructions. It detaches in five minutes to let you use the tractor for other rear-end attachments.

Here's a tremendous loader value. It's the all new Economy Model Davis "99" Loader which has many advanced features, but is offered at a price below any other loader with comparable quality.

The widely copied Davis design with box frame construction has been maintained, but vastly improved. Lift arms, frame, and pivot pins have been enlarged and strengthened. Increased operating pressure to 2,150 P. S. I. with 10 gpm pumps provides fast action with capacity to handle maximum loads with minimum effort.

It has double-acting bucket cylinder and single-acting lift cylinders which are heat-treated, centerless ground and finished in hard chrome for long life. The Davis "99" also has a wire mesh, replaceable type filter as standard equipment.

You'll like the ease of operation, maneuverability and visibility that all Davis Loaders offer. With the close, built-in design and no obstructions above the tractor you work in areas unaccessible to most other loaders. Yet you still have the reach and dump capacities that let you work with high-backed trucks.

A wide variety of attachments let you handle practically any type of work with one basic unit.

Of course the more deluxe models of Davis Loaders with down pressure, twin dump cylinders and Davis Backhoe mounting are also available.

Davis Loaders and Backhoes are available for most utility models of Ford, International, and Allis Chalmers tractors through your Davis Distributor. Write him for name of your nearest dealer.

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Another district-utility irrigation-hydro program

ANOTHER irrigation district has helped to solve its water supply problems by enlisting the cooperation of the Pacific Gas and Electric Co. Brown's Valley Irrigation District in Yuba County, Calif., has reached an agreement with PG&E "which almost assures construction of the Virginia Ranch Reservoir Project."

The private utility has agreed to enter into a long-term contract for the use of Brown's Valley district water in the existing PG&E Colgate and Narrows powerhouses on the Yuba River. The agreement would develop an important source of revenue for the district, to be used to assist in financing the Virginia Ranch Reservoir Project.

Virginia Ranch Reservoir, to be formed by a dam on Dry Creek about 4 mi. northeast of Brown's Valley, will have a capacity of 55,000 ac.-ft. and an average annual yield for irrigation in excess of 30,000 ac.-ft. Engineers estimate the dam, reservoir and related water distribution facilities will cost about $4,000,000 and will take two years to build.

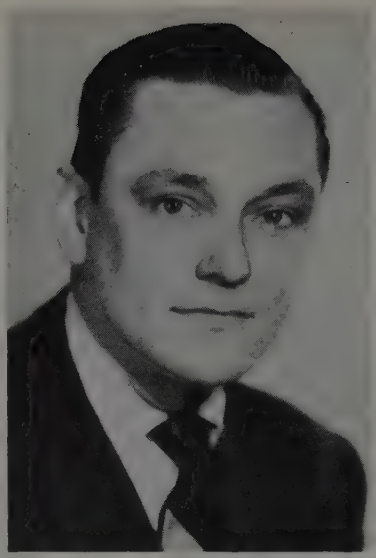
PG&E has offered to pay B.V.I.D. $62,000 a year for use of the district's water to be diverted through the company powerhouses. The water will be returned to the river for downstream use by the district.

Expansion of filter plant without interruption

A CONTRACT to expand Upper San Leandro Filter Plant has been awarded by the East Bay Municipal Utility District to the joint venture firm of Stolte, Inc. and Morrison-Knudsen Co., Inc. Amount of the bid was $2,858,734. The plant will be nearly tripled in capacity by the expansion. Construction will begin early in 1959 to enlarge the present capacity of 31 mgd. to 84.

In addition to new filter beds, the project includes two new filtered water reservoirs with a total capacity of 8 mg. The new storage basins will provide water for filter washing, and also additional water for fire protection and distribution.

Construction of the additions, all on EBMUD property, is expected to take three years, McFarland said. One of the unusual features of the construction schedule is that the plant must continue in operation.



BY COMBINING the Northern California (heavy) and Central California (building) Chapters of the AGC at their annual convention, the resulting Northern and Central California Chapter provides a single organization to represent all AGC members in the northern part of the state. The manager of the new combined chapter is *Bruce McKenzie* (above), former manager of the Central California Chapter.

Structures underway for 1960 Olympic Games

STRUCTURAL STEEL work has been under way for the Ice Arena and rinks at Squaw Valley, site of the 1960 Olympic Winter Games. The 900-ton steel framework will be part of one of the most sensational buildings of its kind—wide as a football field is long, capable of holding 11,000 spectators and, at the same time, designed to carry the heaviest snows of the Sierra Nevada.

This Snow Palace will be used for figure skating, hockey and the official opening and closing ceremonies. Its cable-supported roof makes the frame appear almost like a bridge. And the 87-ft. high glass-enclosed north wall combined with the open end at the south for spectators and bleachers make this a unique structure.

The $3,000,000 building will be completed in time for the Olympic Winter Games next February. In order to accomplish this, the general contractor, Diversified Builders, Inc., and the steel fabricator, Pittsburgh-Des Moines Steel Co. of Santa Clara, utilize every snow-free day. Heavy winter weather and deep snows will stop construction work for several months.

One of the clever features of the design will be a heating system to reduce snow load on the roof by melting. According to the architect, this will not be installed until next year. Hence the steel frame will stand uncovered during the winter months.

Many special problems had to be solved by the structural engineers. Among the most involved of these was the movement of the 300-ft. roof due to varying snow loads and the movement of the glass enclosed wall due to expansion from changes in weather. According to Charles DeMaria, structural engineer, the solving of these problems took nearly as much time as the basic design of the building. The firms of H. J. Brunnier and John M. Sardis, structural engineers, San Francisco, did the structural design.

Tellurometer

(Continued from page 64)

ing the two-way radio built into each unit. To obtain a measurement of the distance between the two stations (from 500 ft. up to 40 mi.), the master unit transmits a micro-wave signal, which is picked up by the remote unit and re-transmitted to the master. The outgoing and in-coming signals are "compared" in the master's circuitry and the comparison indicated in mille-microseconds (millions of seconds) on the instrument's panel. Readings are taken on several different frequencies (the instrument operates on 20 in all) to eliminate any errors and obtain an average.

By a single computation, the time taken for the micro-waves to travel the distance is translated into miles, feet, and inches. Psychrometer and barometer readings are taken at both stations to determine adjustments for very high order accuracy.

It requires only about 10 min. to obtain the measurement and another 10 min. to dis-mount and repack the equipment for the move to the next station. The master unit is usually set up at every other station down a traverse and merely swung around to pick up the remote unit when it is moved to another point. If the object is to establish controls over a wide area the master unit is usually set up on a high point and the other unit moved around wherever desired.

Some engineers assign two men to each unit to help take notes and handle the equipment. No special knowledge of electronics and no training other than a few hours of instruction are necessary.

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The Curtiss-Wright line includes 6 pull scrapers from 8 to 30 cu. yds. struck and 5 self-propelled scrapers from 7 to 26 cu. yds. struck, 3 of which are interchangeable with rear dumps of 25 and 35 ton capacities.

SOUTH BEND DIVISION
CURTISS-WRIGHT CORPORATION
SOUTH BEND, INDIANA

. . . for more details, circle No. 40 on Reader Service Postcard

ENGINEERS and CONTRACTORS

Gilbert G. Stamm is the new regional assistant director of the Bureau of Reclamation at Boise, Idaho. Stamm, who was regional supervisor of irrigation, was promoted to fill the vacancy created by the retirement of **William H. Tuller.** A federal government employee for 23 years, Stamm joined the Bureau in 1946. He was named superintendent of the Central Snake projects office in 1954, and was appointed associate regional supervisor of irrigation in 1955, and supervisor in January 1958.

* * *

Lloyd W. Martin, of Reed & Martin, Inc., Fairbanks, Alaska, has been elected president of Alaska Chapter, Associated General Contractors. Other officers chosen to serve with him during 1959 are: vice president, **H. E. Gall** of Patti-MacDonald Construction Co.; secretary-treasurer, **Lloyd A. Burgess** of Burgess Construction Co. **W. S. Hibberd** is Chapter manager.

* * *

Charles D. De Maria is the newly elected president of the Structural Engineers Association of Northern California. A registered civil engineer in the State of California since 1946, De Maria has been employed by H. J. Brunnier, Structural Engineer of San Francisco, since 1941 with the exception of three years of World War II service.

* * *

Announcement is made of the retirement of **Dallas "Pete" Young** from the firm of MacDonald, Young & Nelson, Inc., a major general contracting firm with headquarters at Oakland, Calif. A veteran of 45 years in the construction business, Young has been with the company for the past 13 years, prior to which he was with MacDonald & Kahn for 25 years. Although he has sold his interest in MacDonald, Young & Nelson, Young continues as a vice president, and in this capacity he will supervise and manage construction of the Giants Stadium for which the firm is acting as manager of construction for Charles L. Harney, Inc.

Announcement is made from the headquarters of Utah State Road Commission in Salt Lake City of new job locations for several of its resident engineers. **Kenneth Hepworth** has been assigned to a project in Orem where preliminary engineering is being done for proposed primary route. **William J. Pratt** has been assigned to a job on State Road 68 where General Contractors Corp. is laying 1.1 mi. of road-mixed bituminous surfacing. **Arland F. Esklund** is assigned to State Road 47 where road-mixed bituminous surface is being laid by Nelson Bros. Construction Co. **Carl M. Fonnesbeck** has been assigned to LeGrand Johnson Construction Co.'s contract on State Road 154 covering placement of concrete box culvert over canal near Collister.

James L. Deaton has been assigned to project on U. S. 160 where a 25-ft. structure and road-mixed bituminous surface road is under construction by J. M. Sumsion & Sons. Deaton is also resident on another Sumsion contract. This work consists of laying an 8-mi. stretch of road-mixed bituminous surface and a concrete structure on State Road 126 near Moab. **William Marsden** is resident on highway construction near Liberty on State Road 162 where a 64-ft. steel and concrete structure and a graded road are being built over the North Fork of the Ogden River by General Contracting Corp. **Edward Kennelly** has been named resident on a job consisting of grading, draining and filling 2.4 mi. of Interstate Highway. Gibbons & Reed Construction Co. has this contract, the first let on the North-South Salt Lake Freeway. **Rex Sutherland** has been named resident in charge of project at Salt Lake City where Gibbons & Reed is widening and resurfacing State Road 71.

* * *

North Pacific Consultants, engineering consulting firm of Portland, Ore. and Anchorage, Alaska, announces expansion of its personnel. Joining the firm in key positions as civil engineers are **Stanley E. Sporseen,** formerly head of the project planning section of the Portland District of the Corps of Engineers; **Clayton Mundt,** formerly with Tacoma Public Utilities; and as electrical engineer, **Theodore W. Troost,** formerly with Pacific Power & Light Co.

North Pacific Consultants are the design and construction engineers for Cooper Lake hydroelectric project near Anchorage. They are engaged in preliminary design of a steam electric power plant near Fairbanks, Alaska, and for development of the hydroelectric power potential of the White Salmon River in Washington.

* * *

S. B. Barnes was elected president of the California State Board of Registration for Civil and Professional Engineers at its January meeting. Barnes is a prominent civil and structural engineer in private practice in Los Angeles.

* * *

H. E. Hedger has retired as chief engineer of the Los Angeles County Flood Control District. Appointed by the Board of Supervisors as his successor is **M. E. Salsbury** who was senior assistant chief engineer.

CALENDAR

Feb. 8-13 — American Society of Civil Engineers, annual convention, Los Angeles, Calif.

Feb. 12-14—Engineering & Grading Contractors Association, annual meeting, Hotel del Coronado, Coronado, Calif.

Feb. 23-26—American Concrete Institute, annual convention, Statler Hilton Hotel, Los Angeles, Calif.

Mar. 3-4—Annual Highway Conference, University of Utah, Salt Lake City, Utah.

Mar. 3-5 — Annual Highway Conference, College of the Pacific, Stockton, Calif.

Mar. 5-6—Annual Highway Engineering Conference, University of Colorado, Boulder, Colo.

Mar. 18-20—Annual Road Builders Clinic, Washington State Institute of Technology, Pullman, Wash.

Mar. 23-25—Motor Vehicle Maintenance Conference, Civil Engineering Department, University of Washington, Seattle.

Mar. 23-25—Annual Western Safety Congress and Exhibits, Ambassador Hotel, Los Angeles, Calif.

NEW MARTIN TRAILER

Shown above, the new Martin **R5TL-T1 Trailer**

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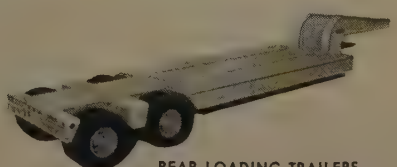
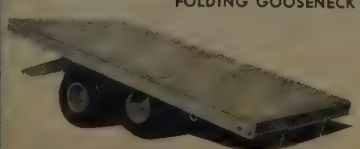
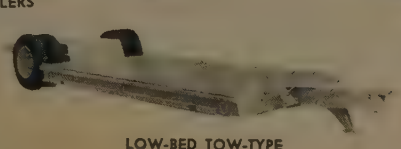


REAR LOADING TRAILERS



OVER-THE-WHEELS TILTING PLATFORM



LOW-BED TOW-TYPE TRAILERS

BETWEEN-THE-WHEELS TILTING PLATFORM

SUPERVISING the jobs

Paul Cherrington is general superintendent for Thorn Construction Co., Inc., successful bidder on 9.2 mi. of grading and surfacing in Juab County, Utah. **France Bradley** is superintendent of gravel operations, and **Frank Jenkins** is grade foreman. The $234,828 project started in October and will be finished about June.

* * *

Byron Williams is acting as general superintendent on another of Thorn Construction Co.'s recent awards in Utah. This is a $475,342 job of 9 mi. of grading and surfacing in Juab and Sanpete counties. **France Bradley** is gravel superintendent and **Wayne Evans** is concrete superintendent. Scheduled for completion in July, this project has been under way since October.

* * *

L. J. Curtis, project manager, is head man on earthwork, lining and structures, Ashland lateral diversion dam and extensions, Talent Division, Rogue River Basin Project, Ore., a $305,851 contract in the hands of Cherf Bros., Inc., & Sandkay Contractors, Inc., and Cheney Construction Co. Project engineer is **Lloyd Belz. Anson Pratt** is office manager. **Mike Jacoby** is concrete superintendent on the job which started in October and will be finished next June.

* * *

E. H. Hamdorf is project superintendent for Wells Cargo, Inc., successful bidder at $1,328,985 on 8.5 mi. of grading and surfacing on U. S. 91 about 35 mi. south of Las Vegas, Nev. Project engineer is **Keith L. Stone. C. L. Kaufield** is concrete superintendent, and **Jack Chaffele** is grade foreman. Begun in October, the job will be finished about June.

* * *

Leon C. Sorensen is supervising the $325,564 award to Sorensen Construction Co. covering grading and surfacing and related work on portions of Highway 24 near Hanksville, Utah. Grade foreman is **David O. Warnick.** Work started Oct. 1. Sorensen figures it will be finished by the end of May.

* * *

Lonnie Miller, project manager, and **Theron Johnson,** superintendent, are the key men for Walter E. Meyers & Son, contractor building a 150-ft. prestressed concrete bridge and a 270-ft. concrete box cinder bridge in Adams County, Wash., at a cost of $144,927. The project started in October, earmarked for completion next June.

* * *

Ike Taylor, crushing superintendent for Peter Kiewit Sons' Co., is key man on clearing, grading, crushing, asphalt paving, and four bridges on a section of the Redwood Highway in Oregon. The $329,936 job has been under way since October, with a July date set for the finish.

Ted Jones is supervising reconstruction of existing bridge and trestle with plate girder spans, while maintaining rail traffic, on US 95 in Lewis County, Idaho. John E. Alexander, Inc., is the contractor. Carpenter foreman on the $391,246 underpass work is **Homer Grace,** while **George I. North** is piledriver foreman. **Rod Johnson** is N.P.R.R. inspector, and **E. Kay Montgomery** is inspector for the State. The job started in September and Alexander expects to have it finished about June.

* * *

C. A. Emerson, superintendent for Blanchard Construction Co., is in charge of a $387,845 contract for 7 mi. of grading, structures and surfacing between Wild Horse and Kit Carson on S. H. 8 in Cheyenne County, Colo. Foremen on this grade, soil stabilizing and plant-mix job are **Richard Simmons,** grade; **Oscar Shehorn,** oil; and **Orville Karr,** gravel. Work started in September and will probably be finished in June.

* * *

Ray Hollern has been superintending a $143,831 contract which was awarded to Union Credit Co., contracting company headed by **George B. Schotte,** covering 3.4 mi. of grading, draining and surfacing on the Eden-Great Falls highway in Cascade County, Mont. **Al Schnidt** has been assisting as foreman on this job.

ON LOCATION at a $3,600,000 Griffith Company project in Los Angeles County, Calif., are (l. to r.) *Jack Nicola,* job superintendent; *Charles Blackburn,* State supervisor-engineer; *Clair Shively,* job engineer; *Mel Kruse,* structural foreman. These men hold key positions on construction of Sherman Way underpass, Van Nuys Airport 2,000-ft. runway extension and resurfacing of existing runway. Before completion of the project in April a total of 28,000 cu. yd. of concrete will be poured.

JOB RECORDS PROVE

Firestones turn downtime into worktime profits!

Where the going is rough, records prove job-engineered Firestone tires give you extra hours of service! Cost-conscious contractors count on Firestones to keep *all* off-the-highway projects—from earthmoving to grading and hauling—rolling on schedule. Here's why—they're built with Firestone Rubber-X, the longest wearing rubber ever used in Firestone tires! And Firestone S/F (Shock-Fortified) nylon and rayon bodies withstand bruising shock and impact for maximum tire protection. With treads engineered for every job, Firestone off-the-highway tires deliver the extra stamina, strength and pulling power that turns downtime delays into worktime profits! See your Firestone Dealer or Store and ask about the full line of Firestone tubeless and tubed off-the-highway tires and on-the-job tire service. *Firestone T.M.

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Thomas A. Dolan, general superintendent, assisted by **William Kepptie** and **Oscar Corneliusen,** foremen, is in charge of construction of three concrete bridges on the Gibbon and Lewis rivers in Yellowstone National Park, Wyoming. Work on the $424,000 undertaking started last June and will be finished next July. Cop Construction Corp. is the contractor.

* * *

James Rea, job superintendent for Watkins Construction Co., is in charge of work at Mountain Home AFB, Mountain Home, Idaho, consisting of off-site utilities: streets, curbs and gutters, street surfacing and storm drainage, and landscaping in connection with 270-unit housing project now being built. Rea moved to Mountain Home from Scoville on completion of modifications of I.E.T., A.N.P. area at AEC there, and hoped to start his present assignment in November, with 140 calendar days to complete.

* * *

Ed Doerr is job superintendent on grading, draining and surfacing of 9½ mi. of access roads for the Air Force on the Gila Bend gunnery ranges. This is a $138,000 job, on of three Arizona contracts recently won by John H. Evans & Co. In charge of a $115,000 job is **Robert N. Ewing,** project manager, with **Carl Moore,** general foreman. This project is at Mt. Lemmon Air Force Station, and covers modifications to the Corps of Engineers operations building. Contractor Evans has **Jack R. Bowker** as general foreman and **Lee Myers** as project manager on Air Force roadwork at Gila Bend and Winslow Air Force stations.

* * *

Dee Black is general superintendent and **M. R. Sewell,** plant superintendent, for Imperial Paving Co. which will soon complete grading and surfacing on 15.2 mi. of highway in Guadalupe County, N. Mex. At a cost of $175,890, the asphalt resurfacing work is being done to provide a new skid-resistant surface.

* * *

A. M. "Spec" Willis is project superintendent for C. H. Elle Construction Co., under **Lindsey "Tex" Henry,** company superintendent, on a $755,000 highway award. The 2.8-mi. grading and surfacing job in Big Horn National Forest,, Wyoming, got under way last October, with completion expected to be about May.

* * *

Joe Nesbitt, superintendent, and **Ike Taylor,** crusher foreman, are key men on Peter Kiewit Sons' Co.'s contract for construction of four bridges with approaches on Rough and Ready Creek – Dwight Creek section of the Redwood Highway in Oregon. The $329,936 job has been going since October, scheduled for completion next fall.

* * *

K. N. Baird, superintendent, and **R. O. O'Brien,** head mechanic, are key men for Woodward Construction Co., which recently completed a $117,225 contract for grading and surfacing approach road to new bridge across the Snake River in Teton County, Wyoming.

* * *

Robert Phillip, general superintendent for Jack B. Parson Construction Co., is winding up a $112,-728 job of 4.8 mi. of grading and surfacing on the Lanark road in Bear Lake County, Idaho. Assisting as foremen were **Joe Richardson,** grade; **LaMar Jones,** pipe, and **Paul Krambule,** equipment.

* * *

James Cummings, foreman, is key man for Phoenix Construction Co., Inc., on 2.6 mi. of grade and pave with plantmix in San Luis Obispo County, Calif. Plant superintendent on the nearly completed $259,188 job is **John Michelson.**

* * *

N. L. Van Valkenburgh is acting as his own project superintendent in the execution of a $2,403,000 award to N. P. Van Valkenburgh Co. for roads, parking areas and utilities at the Naval Missile Facility, Point Arguello, Lompoc, Calif. Mechanical superintendent is **R. F. Roberge.** Earthwork is being done by A. T. Smith Co., with **A. T. Smith** superintending. The electrical work is by Electrocraft, Inc., with **Dale McCreary,** superintending. Under construction since September, the job is now about complete.

* * *

C. M. Jarnagin has been superintending a $115,823 job for Hagen Construction Co., Inc., covering construction of underpass on the Oracle Junction-Globe highway in Arizona.

* * *

Richard N. Moseman, superintendent, and **Alexander Gillespie,** carpenter foreman, are two of the key men employed by C. K. Moseman & Son on construction of a concrete bridge over the San Benito River south of Hollister, Calif. Contract price, $231,935.

Wally Hinkel, superintendent, **Al Reimer,** bridge superintendent, and **Everett Wentworth,** grade foreman, are chief men on the $191,594 job now completing by Thomas Construction Co., for grading, surfacing and bridge construction east of Centerville, Calif.

* * *

Ben Keller is supervising construction of a steel and concrete bridge and grading and surfacing of approaches, located on the Cody-Powell road in Park County, Wyo. **Charles M. Smith** was the successful bidder at $125,172, started the job last October, and will be finished about April.

* * *

J. N. Matich, project manager, **Ed Morris,** assistant project manager, **R. A. Hays,** project engineer, and **L. McClain,** structure superintendent, comprise the key personnel on 3.4 mi. of grading and surfacing in the city of Yucaipa, Calif. Matich Constructors is doing the work at a cost of $365,974 and expects to be finished in April.

* * *

Clarence Craig is superintending a street job for W. E. Barling, Inc., contractor. Work consists of grading, surfacing and related items in Powell, Wyo. Barling successfully bid the job at $241,135.

* * *

R. E. "Bob" Smith is superintendent for C. B. & S. Construction Co., a $450,982 project of grading, structures and surfacing on 2.6 mi. of highway between Garrison and Helena in Montana. General foreman is **Floyd Wine. Dwight Nelson** is office manager. Work has been under way since October and is earmarked for June completion.

* * *

Les Christman is job superintendent for A. Teichert & Son, Inc., successful bidder at $206,692 for grading, structures and surfacing in the city of Chico, Calif. Contract calls for two bridge widenings, and radio control traffic signals which latter is subcontracted to Luppen & Howley. General foreman for Teichert is **Harold Bell.** Job started the first of November and will be finished April 1.

* * *

Tom Terry, assisted by **Thiel Wamsley** and **Ross Bingham,** is supervising a $293,996 project for Wangsgaard-Peterson Construction Co. covering 8.5 mi. of grading and surfacing near the line of Carbon and Emery counties. Work started in October and will end this April.

* * *

Vern Brandon, superintendent

Decisions! Decisions!

Not with THE BIG E

the tractor that thinks for you . . . . Automatically selects the right power ratio for any load or strain!

Just one of the many job-time and man-hour saving features of the modern Eimco 105 is the exclusive torque converter-Unidrive team, the only drive and transmission that is engineered with oil cooled, positive engagement clutches that never . . . really never . . . need adjustment. No master-clutch to wear out! No clutch pedal to push! No gears to shift!

You get a smooth, powerful drawbar pull or push that adjusts automatically, through an unlimited number of ratios, to the load and strain . . . even if the tractor is at a standstill! The Eimco 105 engine will never stall through the torque converter.

And you get all the other exclusive Eimco 105 features too . . . upfront full visibility operator location; dual final drives that set a new standard in maneuverability; simple controls that increases work efficiency and output.

Let an Eimco sales-engineer demonstrate the many advantages of the modern Eimco 105. Contact the sales office nearest you or The Eimco Corparation, P. O. Box 300, Salt Lake City 10, Utah.

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B-380

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for Schmidt Construction, Inc., is in charge of 4.2 mi. of grading, structures, and gravel surfacing on State Highway 315 between Hamilton and Pagoda in Colorado. Assisting as foremen on this $185,549 contract are **Tony Deckert**, dirt; **Jess Robertson**, labor, and **Frank Gamarra**, crusher.

Turtle Club

APPLICANTS recently admitted into membership in The Turtle Club from the West and their case histories follow:

Carnice Marion, in the employ of Merritt-Chapman & Scott Corp. on the Glen Canyon Dam project in Page, Ariz., was struck on the head by a 10-lb. piece of sandstone which fell 75 ft. from the side of the canyon wall. His hard hat was knocked off by the blow, but had he not been wearing it he might have suffered a serious head injury

William Price is also employed by Merritt-Chapman & Scott Corp. on the Glen Canyon Dam project. While scaling down loose rock in a tunnel heading, a slab of sandstone rock weighing 500 lb. fell 25 ft., striking Price and knocking him down. His hard hat deflected extreme force of the blow preventing probable serious head injuries.

L. B. Jaynes, a miner for Peter Kiewit Sons' Co., was working at Oroville, Calif., on a tunnel project when a boulder weighing 25 lb. fell about 20-ft. striking his hard hat. The heavy blow caused a severe neck strain, but he might have received a very serious injury had he not been wearing his safety hat.

Louis Nakwas is employed by Misco Westcoast at Canyon Ferry Dam, Mont. He was working at the face of the bank when a 100-lb. rock became dislodged and fell down the bank about 15 ft., striking his head and then sliding across his face. He received severe facial injuries and crushed bones, but were it not for his safety hat he would probably have sustained a skull fracture.

Jack L. Franklin, an employee of Guy F. Atkinson Co. in Ukiah, Calif., was working in the tower of the Coyote Dam project when a bolt dropped 75 ft. through staging, falling on Franklin who was using a chipping hammer directly underneath. Had he not been protected by his hard hat he might have suffered serious injury.

Satoru Gota, an employee of Walker Moody Construction Co., in Honolulu, Hawaii, was working on concrete form panels overhead when a piece of plyform weighing 25 lb. fell, striking him on the head. The safety hard hat he was wearing prevented a possible serious or fatal injury.

Don O. Coykendall is an employee of Peter Kiewit Sons' Co. at Oroville, Calif. He was operating a slusher when it hit the protective cage causing it to fly upward. Coykendall was wearing a safety helmet which cushioned the 150-lb. blow and completely protected him from serious injury.

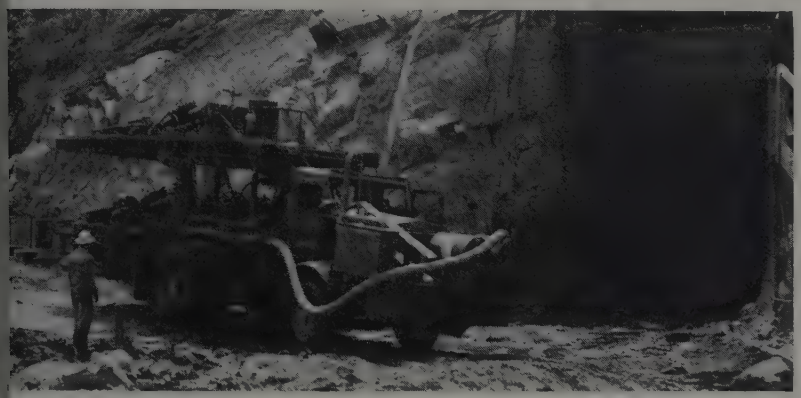
Hughlett F. Griner is a jackhammer operator for the Salt River Project at Phoenix, Ariz. While blasting on a roadway the crew had taken refuge from the blast under a truck some 300 ft. away. A 2-lb. rock was thrown over a hill between the truck and blast, struck a large rock and glanced off, striking Griner on his hard hat. The hat cushioned the blow and protected him from serious injury.

Glenn L. Kay is employed by the U. S. Forest Service in the Cleveland National Forest, San Diego, Calif. While at work he threw an air hose from a heavy coupling across a large boulder for another man to reach. Before he could do so, Kay's foot slipped, pulling the hose so that it and the coupling struck his safety hat, which cushioned the blow and saved him from serious injury.

The Turtle Club is an international organization formed for the purpose of providing contact with those construction men who have had the mutual experience of their lives having been saved by the wearing of a hard hat; to promote more widespread use of head protection; and to assist in the safety movement generally.

Any person who submits a verified completed application form may apply for membership. Full information may be obtained by addressing your inquiry to *Western Construction*, 609 Mission St., San Francisco 5, Calif., or to E. W. Bullard, International Sponsor, The Turtle Club, 2680 Bridgeway, Sausalito, Calif.

CONSTRUCTION BRIEFS



Mammoth Pool tunnel report

CONSTRUCTION on the 8-mi. power tunnel on the Mammoth Pool Project, 64 mi. east of Fresno, Calif., is proceeding on schedule. The Sept. 1958 issue of *Western Construction* carried an extensive review of the overall project. At that time the tunnel work was just beginning.

Utah Construction Co., prime contractor for the tunnel work, by November had pushed in over 3,700 ft. at the downstream outlet portal, located some 16 mi. east of the town of South Fork. The area is in the San Joaquin River watershed in Sierra National Forest. Bechtel Corporation is responsible for overall project management in addition to construction of the dam and powerhouse, for the Southern California Edison Co.

Upstream from the power tunnel's Rock Creek adit, excavation had progressed some 1,300 ft. into jointed granite. Utah Construction Co. is hoping to have the tunnel work completed by late 1959. With the job fully under way, some 600 men are employed on the project.

When the tunnel work is proceeding at full speed, the miners will be working five faces simultaneously; one at the outlet portal, two off the Rock Creek adit, and two at the Shakeflat Creek crossing.

The formation is hard granite which is fairly uniform. The condition of the rock is such that little roof control is needed. In the Rock Creek adit portal, rigid sets with steel lagging were used for about 150 ft. because of jointed rock which was heeling away.

With rock control at a minimum and with a completely equipped blacksmith shop at the Rock Creek adit to service steel for the five tunneling operations, the contractor is equipped to establish some records in pushing through the 20-ft. diameter horseshoe bore.

At the outlet portal, downstream, Paddy O'Dowd, superintendent, and his men on their better days have been making better than 60 ft.

The tunnel from the outlet portal is being driven by a three-deck jumbo gantry mounting ten drills. Bethlehem 1¼-in. round hollow drill steel is being used in 6 and 12-ft. lengths. This was supplied through Earle M. Jorgensen, San Francisco. Bits of 1⅝-in. diameter are used, and holes are drilled on 30-in. centers. The drilling time is about 7 min. per hole.

With the gantry, a cherry pick system is used to haul muck in 6 and 8-yd. cars. A Conway 101 is used for loading. The prime mover is a battery powered locomotive.

The power tunnel consists principally of a 20-ft. average diameter unlined horseshoe section with a 6-in. nominal thickness concrete floor. At locations of light rock cover, structurally unsound rock or slaking rock, a lining of reinforced gunite or concrete will be provided. However, the total length of tunnel requiring supports is expected to be relatively short in comparison with the over-all length of the tunnel. Where gunite lining is required, a minimum cover of three inches over the rock or over the steel rib supports, where used, will be provided.

The average annual energy capacity of the Mammoth Pool Project is estimated to be about 636,000,000 kw. hours. The powerhouse is expected to go on the line in the spring of 1960.

Prefab concrete chute

THE NEED FOR special concrete chutes or job fabricated chutes is eliminated with the use of a standard Uni-Form Panel and adjustable pilaster form. Engineers have devised a simple method of providing a combination pouring pocket and concrete chute by using standard items. The panel quickly becomes a chute when tilted into position and secured with bolts to adjustable pilaster forms. After pour is made, bolts are removed

and form is pushed back into place. Additional information available from Universal Form Clamp Co.

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. . . for more details, adv. pgs. 96 & 97, circle No. 46 on Reader Service Postcard

14 cars and trucks per minute today

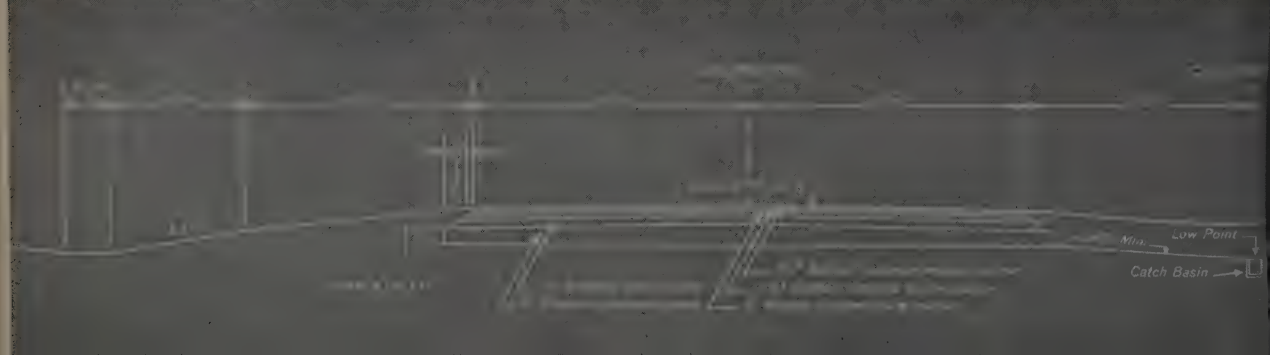
Here's one reason why Ohio'

Pounding traffic! Growing traffic volume! Greater and greater axle loads!

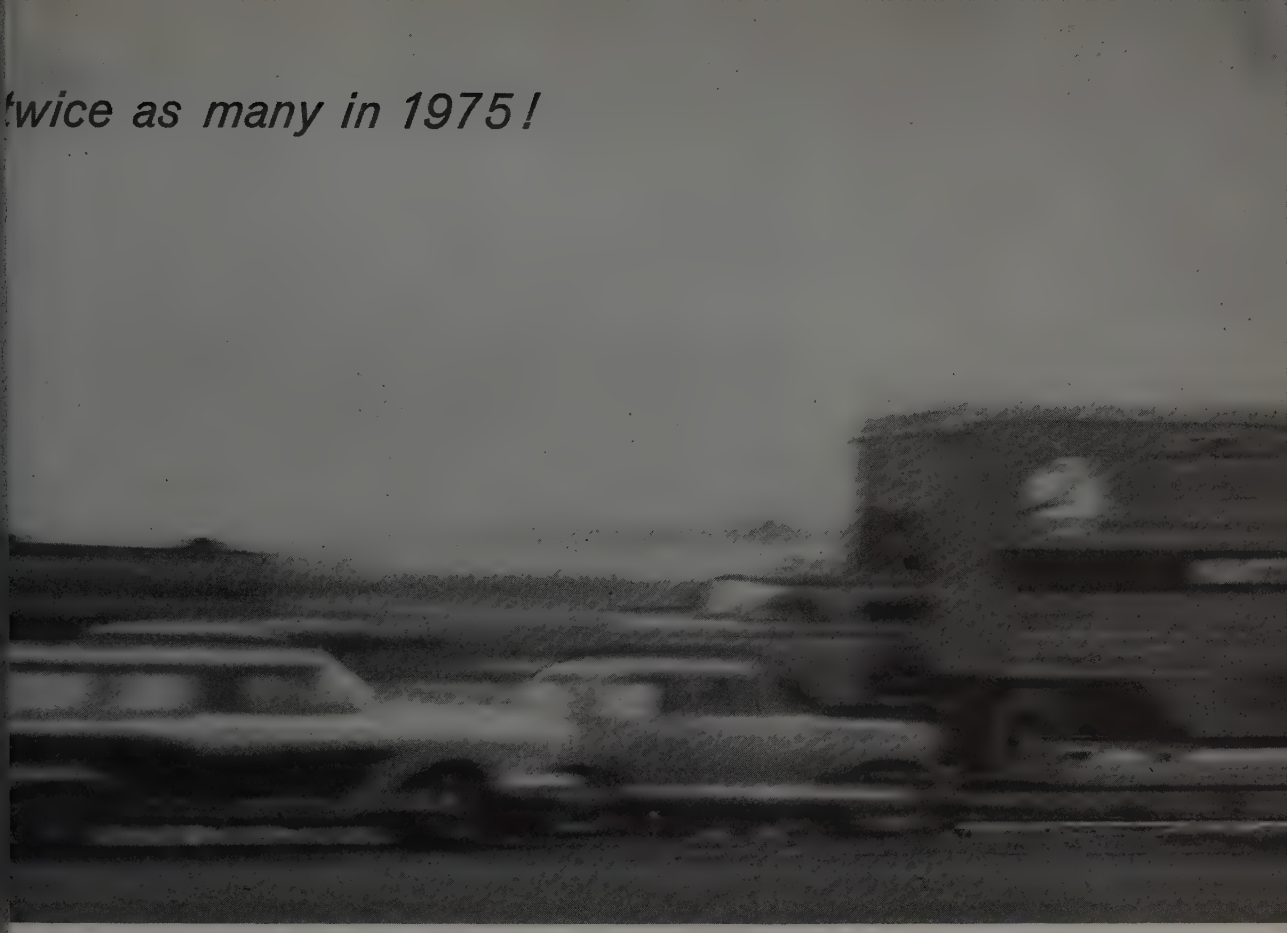
These assaults on pavement structures are **not** restricted to the 90-10 Interstate highways. They're common problems faced by engineers responsible for thousands on thousands of miles of road like Ohio's new State Route 73 . . . roads which are t built largely out of State funds and wholly maintai with these monies.

In most terrain these roads . . . like your Inters roads . . . should be Asphalt-paved. For many reas Perhaps the **most** important is that modern Asp

Typical of modern heavy-duty Asphalt sections is this one for Ohio's 5-mile State Route 73 between Middletown and Franklin. Median section is modified to a raised and curbed 15-foot section in urban areas. Pavement must support a heavy traffic of trucks carrying steel, machine tools and other indu products produced locally. Cost per sq yd for this A road $3.03; $2.00 per sq yd under the prevailing pri reinforced concrete.



twice as many in 1975!



ew Route 73 is Asphalt-paved

nent structures are being built today to handle esired loads with **any** desired built-in durability **nd these roads save money.** Cost less to build, o maintain.

Your State can lay more road for the same money if you design for Asphalt concrete. More road means the traffic load on **all** pavements in your State can be kept at a maintenance-saving minimum.

THE ASPHALT INSTITUTE
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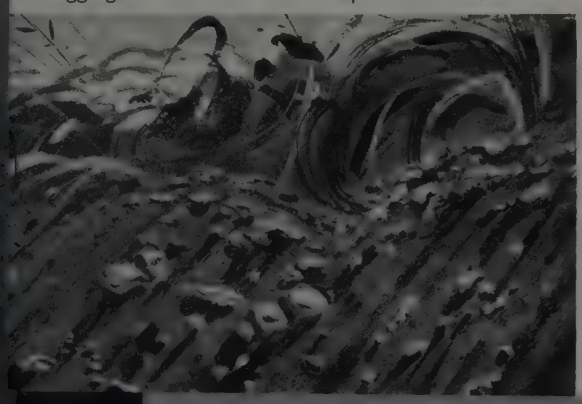
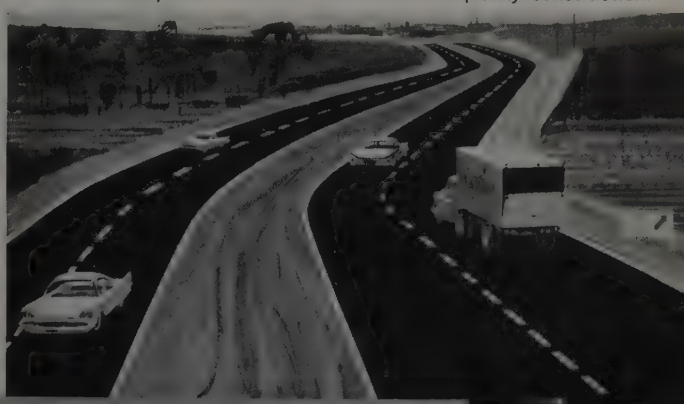
till in right-of-way favored Asphalt pavement construc- henever sub-soil of this type is found it provides excellent subgrades for Asphalt paving. Proximity of suitable r-run aggregate also favored use of Asphalt on Route 73.



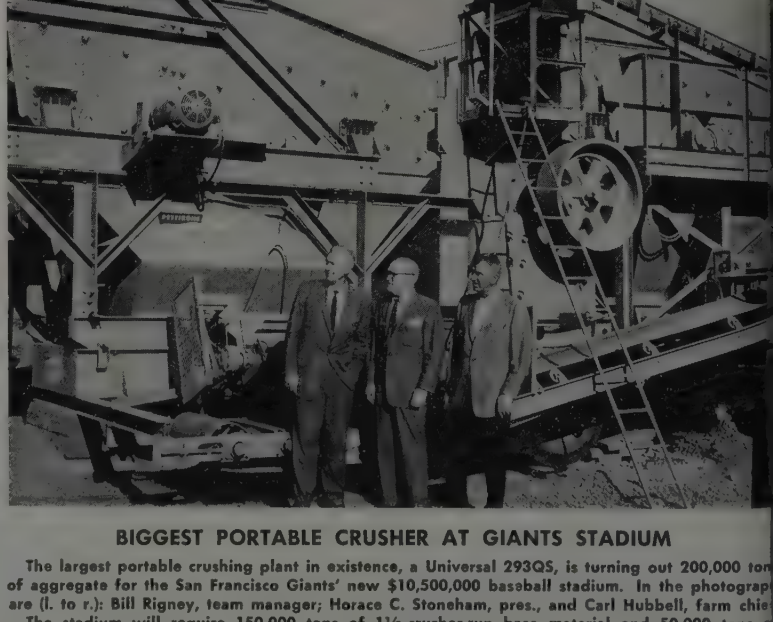
Comfortable! Durable!...because it's modern Asphalt concrete. Notice the smooth-riding, skid-resisting surface. Notice the visibility, too, of the traffic markings on Route 73. With Asphalt concrete, this road sets a standard for quality construction.



Scaffold system for bridges

THE PHOTOGRAPH shows a bridge under construction across Putah Creek in California by Gordon H. Ball Construction Co. The scaffold shoring used on this job is a new system designed to permit complete flexibility in spacing the frames. The scaffold shores, distributed by Acrow California, do not depend on a conventional system of cross braces to tie the frames together. Instead, a horizontal ledger tube is used which permits th frames to be positioned at any de sirable spacing, to suit loading con ditions. Where the load is light th frames can be spaced further apar

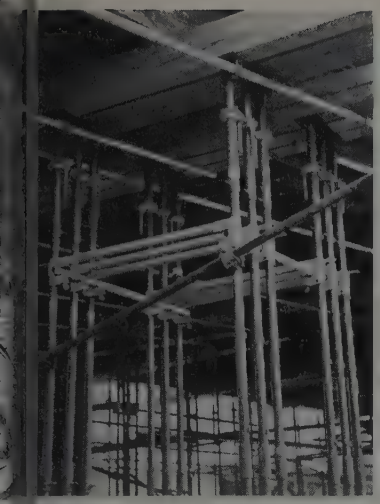
To do away with loose connec ting parts when connecting th frames together vertically, eac frame leg has a sleeve. For fin adjustments in height the highes frames are fitted with short Acro shores which can be adjusted quick



BIGGEST PORTABLE CRUSHER AT GIANTS STADIUM

The largest portable crushing plant in existence, a Universal 293QS, is turning out 200,000 ton of aggregate for the San Francisco Giants' new $10,500,000 baseball stadium. In the photograp are (l. to r.): Bill Rigney, team manager; Horace C. Stoneham, pres., and Carl Hubbell, farm chie The stadium will require 150,000 tons of 1½-crusher-run base material and 50,000 tons o ¾-in. type B plant mix. Seating capacity will be 40,000.

General contractor Charles L. Harney, Inc., has nearly completed the 3,500,000 cu. yd. of earth moving. An article on this project appeared in the May 1958 issue of WESTERN CONSTRUCTION



y turning a collar. The collar
rs against a pin connected to
innermost of two telescoped
es.
he close-up view shows how the
nes can be grouped closely to-
ner under a heavy load. Note
adjustable shores at the top.
diagonal braces are easily at-
ned and give the system overall
ility. . . . *Circle No. 156*

nk shafts fast

ATTUCK DENN Mining Co.
Grand Junction, Colo., can
m a record for sinking a shaft.
record was attained at the Bar-
shaft the firm has completed
a carnotite uranium deposit

ut 30 mi. east of Monticello,
h, in San Juan County.
n one 24-hr. period, the miners
ve 24 ft., or at the rate of 1 ft.
hr. of blasting, mucking rock,
sporting rock to the surface,
In one four-day period, the

. . . *for more details, circle No. 48* →

small 13 x 7-ft. shaft, which is now bottomed at about 850 ft. in the uranium deposit, was pushed down on finished basis 20 ft. each day.

Playing an important role in the success of the mechanized sinking of the Bardon shaft was the perfection of equipment by Machinery Center, Inc., and Shaft and Development Machines, Inc., both of Salt Lake City. This included installation of a 4½-ton Cryderman mucking machine, a collapsible jumbo handling four drills, a very high speed assembly for pulling out rock, a safety sinking skip and special ventilation system that cut down time to 8 min. after blasting.

The large 70-cu. ft. safety sinking skip speeds up the mucking cycle because of its greater capacity and faster dumping action. The skip is attached to two 30-ft. ¾-in. cables which are fastened to a bridle on the main hoisting cable. These cables pass through the standard crosshead and fasten onto the sides of the sinking skip below the crosshead. On reaching the lowest set of timber in the shaft the crosshead comes to rest, secured by chairs, and locking lugs holding the torpedoes are opened by the chairs allowing the torpedoes and skip to pass to the shaft bottom. As the loaded skip leaves the bottom the torpedoes activate the locking lugs, locking crosshead and skip together for movement in the shaft. In event of cable failure, dogs on the crosshead grip the timber guide rails and prevent the unit from falling.

Further information on this operation, with a photograph of the collapsible drilling jumbo, appeared last month on page 98.

. . . Circle No. 157

Hawaii tunnel

HAWAII'S TOUGHEST, and most expensive tunnel driving job —a 2,778-ft.-highway bore through the Koolau Mountain Range on the main island of Oahu—is two-thirds complete, according to the joint venture contractors, E. E. Black Ltd. (Honolulu), Gibbons & Reed (Salt Lake City).

A $3,845,352 contract award by the City and County of Honolulu in November 1957, this bore parallels the previously driven first John H. Wilson tunnel. The two are key links in a new route that will cut travel time in half, to 35 min., between Honolulu and the Kaneohe Bay area.

This improved routing assumes added importance in view of plans now under discussion for develop-

ing substantial new harbor facilities at Kaneohe Bay.

Original bids give a clear indication of the tunnel driving problems expected, and experienced, because of the "ravelly" ground (a soft volcanic formation composed of basalt, cinders, ashes, etc.). The next bidder to the Black, Gibbons & Reed group was more than one million dollars higher.

The poor ground required special attention to heavy supports, plus a driving technique relatively uncommon to United States tunnel work. Adequate ventilation proved a further complicating factor.

Two headings have been worked simultaneously on a three-shift basis since portaling was completed in late December 1957.

From the Honolulu portal, it was necessary to first drive a top pilot drift and wall plate drifts. The top heading then was opened up enough to permit placement of steel ribs and timber lagging, after which the core was removed. Crews kept support steel within one foot of the heading constantly.

Rock conditions in from the Kaneohe portal varied. The initial 70 ft. required full steel sets, then a conventional full top heading was driven 1,500 ft. unsupported. At the 400-ft. mark, however, a 7 x 6-ft. pilot drift to improve ventilation was driven to a point approximately halfway through, an intersection with a cross-cut shaft from the original paralleling tunnel.

This cross-cut shaft also enabled Black, Gibbons & Reed crews to originate footing drifts toward the Honolulu portal, through one of the poorest segments of ground.

Both main headings were concrete-lined as rapidly as excavation permitted, to minimize the danger of the loose ground air slacking.

The tunnel is a modified horseshoe design, with rough excavation dimensions of 34 ft. wide and 28 ft. high, and finished dimensions of 29 ft. x 21 ft. 6 in. Clearance in the finished bore will be the standard 15-ft. highway figure, with the remaining 9-plus ft. of the opening serving as a ventilation duct.

Lightweight jackleg rock drills equipped with 1-in. Sandvik Coromant integral chisel-bit steels from Atlas Copco Pacific, have been standard equipment. Major source of drilling air is a 675-cfm. compressor also supplied by Atlas Copco.

The contractors expect to finish tunnel work slightly in advance of the originally estimated June 1959 completion date.

MASTER MECHANIC

Maintenance Conference

A "BACK FENCE" session for men responsible for maintenance of every type of automotive equipment from motor scooters to automobiles, trucks, buses, and bulldozers, is to be expanded next year to give more an opportunity to air problems of operation and maintenance.

The three-day session of the Motor Vehicle Maintenance Conference, opening March 23 at the Civil Engineering Department, University of Washington, is expected to set new attendance records. A. D. Bullock of Kenworth Motor Truck Company, Seattle, chairman of the trustees for the 1959 conference, said the seventh annual meeting, held last March, had an enrollment of 318.

Broadening of topics to be covered at the 1959 meeting should result in attendance in excess of that at the sessions last March. Panel sessions are being rearranged to give each group a better opportunity to discuss topics pertinent to their special field.

A grass-roots meeting, which started with an attendance of only 47 and has grown with each successive year, the Motor Vehicle Maintenance Conference is self-supporting and is free of set speeches, advertising, and entertainment. Discussions will range from such subjects as the proper adjustment of a torque wrench to the composition of fuels, design of transmissions, and testing of materials.

"More and more manufacturers are sending some of their top engineering personnel to these meetings," Bullock said, "both to aid in work on the panels and to hear for themselves both the compliments and complaints concerning their products. At the 1958 Conference, 53 manufacturers enrolled 76 representatives.

"In a few days they can learn more in these sessions than they could in months of field investigation."

The Conference opens early in the morning on March 23 with breakfast followed by an introduction to techniques for getting the most from the meetings. Panels on gasoline engines, cooling and exhaust systems, tune-up and electrical systems, transmissions, clutches and torque converters, and lubrication will open the day. At the final morning session the tune-up panel is to discuss carburetion and ignition, and the transmission panels move to discussion of bogie assemblies and final drives.

Panels broaden during the afternoon to discussions of air brakes, linings, drums, water control, axles, tires and wheels. Sessions continue after dinner with new subjects, winches, hoists, drums, clutches, steering, both manual and power, scheduled for discussion.

Fuel injection and electrical systems on diesel engines, diesel engines themselves and their exhaust and cooling problems will be discussed in two separate panels sessions at the 8 a. m. meeting on the second day.

Before the conference is ended and diplomas issued to the enrollees, hardly a facet of maintenance and operation will have been overlooked. Utility people will discuss ladders, augers, pumps, rodders, power plants, 4-wheel drives, hydraulic equipment, and power take-offs.

Police departments in several cities sent their maintenance men to the Conference last March.

Panels are broken down into light, medium, and heavy-duty truck and bus; on-highway, heavy-duty truck; off-highway logging and industrial and utilities. Seven panels have been set up for the shop practices discussion on the closing day.

Shop practices sessions, which may be attended by management representatives as well as operating and supervisory personnel, will cover preventive maintenance, repair procedures, bodies, painting, shop records, stores, training programs, and safety, with welding to be covered on panels for contractors and highway departments, logging and utilities.

Enrollment applications may be obtained from Fred Rhodes, Civil Engineering Department, University of Washington, Seattle 5, Washington. The $26 fee covers the cost of enrollment, breakfast Monday morning, three luncheons and three dinners.

Carburetor handbook

The Gumout Division Research Staff of Pennsylvania Refining Company has published a 46-page carburetor handbook entitled, "Know Your Carburetor."

The illustrated booklet describes in nontechnical terms the basic functions of an automotive carburetor, its various parts, and outlines common carburetor troubles with tips on how to correct them. The importance of carburetor care and regular "on-the-engine" cleaning is emphasized.

A few of the twelve sections into which the booklet is divided are: How Carburetors Work, Carburetor Care Simplified, How to Clean Carburetors, How to Adjust a Carburetor, and Mechanical Overhauling of Carburetors. A section is also devoted to Fuel Injection.

The booklet is offered to anyone who wants to know more about carburetors. The booklet is especially good for servicemen who have not had extensive training in carburetor service. *. . . Circle No. 158*

Choosing track shoes

GROUND CONDITIONS dictate the choice of track shoes. A cohesive soil like clay, for example, requires a grouser-type shoe which will provide flotation, traction and resistance to bending or breaking. When shoe width is increased, flotation and traction are improved. Wide track shoes do, however, increase the wear on track components and the possibility of track shoe damage. Use only the width necessary for good flotation.

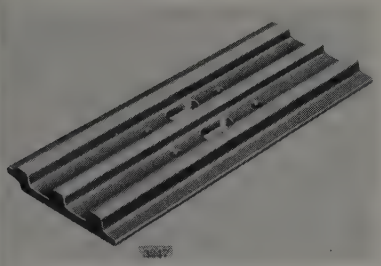
A frictional soil, like pure sand, has a different set of requirements. Since the soil has no cohesive strength, traction depends entirely on the weight of the machine resting on the tracks. A flat or grouser-type shoe with only enough contact area for good flotation should be used.

In rocky area, the recommendation for track shoes is in sharp contrast to those specified for work in soil. The prime consideration is for a shoe that will resist wear and breakage, since flotation is no problem. The type of shoe that will work best depends on the size of the tractor and the type of rock in which it is required to operate. When a tractor must operate exclusively on smooth quarry or mine floors, a flat shoe should be used because of the wear resistance af-

(Continued on page 109)

Track shoes

(Continued from page 102)



ONE OF MANY available types of shoes is the multi-purpose triple grouser shoe. It is designed to give good traction in soft materials, but retains the advantages of the flat and flat center shoe. It has high resistance to breaking or bending and allows limited track slippage in order to reduce wear on the tractor's power train.

forded by the large contact area. When the tractor operates in broken rock, a multi-grouser shoe should be used. These shoes have a higher resistance to wear than a standard single grouser and still retain good traction characteristics. The multiple grousers effectively cross brace the shoes to make them less susceptible to bending and cracking under impact. In either case, no wider shoe should be used than is needed for traction.

There are many jobs, such as logging or snow removal, that require a tractor to operate in ice or snow. Good grouser penetration is necessary to provide sufficient traction when working on ice, although flotation is no problem. In loose snow, good flotation and self-cleaning action are important, but grouser penetration need not be considered. Semi-skeleton-type shoes are designed to meet these conditions and are available in a wide range of modifications.

Small tractors often use rubber shoes in industrial applications. This type of shoe provides good traction on pavements, factory floors and platforms, and prevents scarring floor surfaces on turns. If a machine is to be operated only temporarily on pavements, a street plate attachment can be installed over the grouser shoe to prevent damage to the road surface.

In grouser shoe applications where flotation is needed, but side clearance is a problem, offset shoes are used. Shoes may be offset either to the inside or outside of the track chain centerline, depending upon the need. Inside offset shoes are used on bulldozer-equipped tractors when flotation is required and clearance is necessary to keep the shoes from hitting the C-frame or

push arms. Inside offset shoes are also used when pusher tractors require flotation, and the shoes must remain inside the scraper cut. Outside offset shoes are used when extra flotation is needed and tractor frame interferes with use of larger width shoes. Resistance to bending, however, will be lowest on the overhanging side. (From C. G. Reider, Sales Development Division, Caterpillar Tractor Co.)

Equipment Maintenance

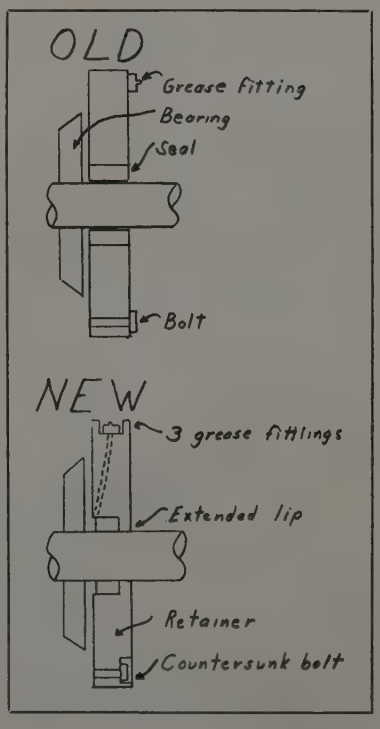
Questions and Answers

QUESTION: (From Art Bartole, Vinnell Construction Co.)
How do you protect seals, bolt heads, and grease fittings on sheepsfoot tampers from cables and foreign materials?

ANSWER: (By Robert Moodie, J. A. Thompson & Son, Inc.)
To protect the grease fittings we counter-sink the fittings so they would be below the outside surface of the retainer and therefore protect it from any foreign material such as cable and wire. We also staggered the fittings equally around the circumference of the retainer so that one of the fittings would be up and accessible to be greased.

To protect the seal we made the retainer wider and extended the lip down to a safe distance from the shaft which enclosed the seal and protected it from the same foreign matter.

We recessed the bolt-holes so that the hexagon head of the bolt is below the face of the retainer and therefore protected.



QUESTION: How did you solve the clutch problems on your skip loaders?

ANSWER: (By T. I. Gibson, Griffith Co.)
We operate some skip loaders that have given us considerable clutch troubles. After trying any and all types of linings with unfavorable results, we decided to try converting to an oil submerged unit. We undertook the machine work in our own shop and sealed all openings into the clutch and flywheel housing, making sure a tight gasket was between the flywheel housing and the block. It was necessary to braze a collar to the clutch housing around the throwout shaft to accept installation of a seal. We also found it necessary to install a seal in the starter shaft to prevent oil from entering the electric motor.

The inspection plate was replaced by a tight cover in which a pipe coupling had been welded. The lined plate was grooved both concentric and radially through the rivet countersink holes with a 1/8-in. square cut-off tool, 1/8-in. deep to allow oil to be forced away from the contact surfaces and avoid excessive slip when engaged. Oil for the clutch was obtained by installing a tee in the pressure gauge line and running a flexible hose to an elbow in the cover installed on the inspection hole. The elbow was plugged with solder and after trial to determine the proper size, a 1/16-in. hole was drilled through the solder plug to meter the proper amount of oil to the clutch.

Excess oil was drained from the case by tapping a hole on the right side of the flywheel housing high

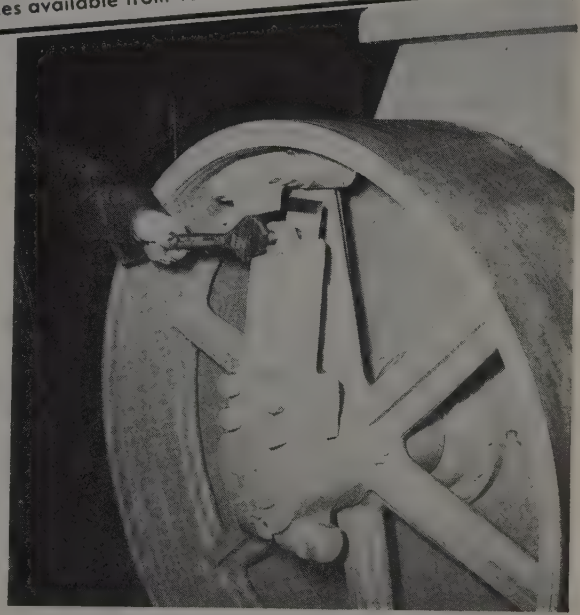
KUE-KEN® crushes more rock per hour, every hour . . . automatic flywheel release saves downtime, costly repairs

Here is a table of tons per hour that will pass through crusher with jaws set at dimensions shown when measured in the closed position.

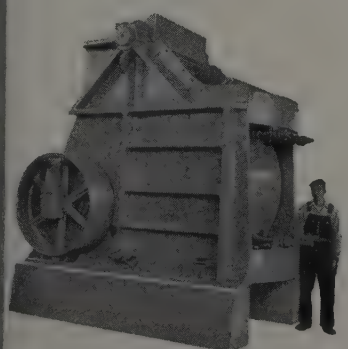
Kue-Ken crusher size	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	Horsepower range
24" x 12"	22	26	32	36	43	50	56					15 to 30
30" x 12"	32	35	38	42	55	70	76	85	110			20 to 30
36" x 10"	38	47	57	67	80	91	105					25 to 40
36" x 20"					70	82	90	115	135	160		30 to 50
42" x 25"					90	120	150	165	180	215	250	40 to 60

Table is based on crushing average hard dry quartz or similar rock weighing at least 100 lbs. per cubic foot when crushed. 32 sizes available from 12" x 5" to 48" x 42".

Tramp iron cannot damage Kue-Ken or cause long, costly interruptions to crushing schedules. With Kue-Ken, an automatic control releases the flywheel and permits it to run free without ratcheting. On correction of the cause, the flywheel can be quickly reset and crusher put back into operation promptly. Control can be set to stop the motor automatically on release of flywheel or to sound an alarm. Kue-Ken gives the lowest cost per ton crushing. It has a built-in lubrication system with thorough lubrication that permits more crushing strokes per minute for greater crushing capacity. Horsepower requirements are less. Regardless of your crushing requirements, see in the above chart how a smaller, less costly Kue-Ken can provide the capacity you require.



Kue-Ken flywheel with automatic release



Write for Catalog

KUE-KEN® CRUSHERS

"CRUSHING WITHOUT RUBBING"

Straub Mfg. Co., Inc., 8382 Baldwin St., Oakland 21, Calif.

Jaw Crushers Gyratory Crushers Overhead Eccentric Crushers Revolving Screens
Classifiers Feeders Rib Cone Ball Mills Concentrating Tables Vibrating Screens

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SEATTLE, WASH. . . . . Washington Machinery Co.
VANCOUVER, B. C. . . . . Universal Equipment Co.
SALT LAKE CITY, UTAH . . . . . Lund Machinery Co.
SAN ANTONIO, TEX. . . . . Closner Equipment Co.
PORTLAND, ORE. . . . . Contractors Equipment Co.
LOS ANGELES, CALIF. . . . . Garlinghouse, Fremon Co.
BERKELEY, CALIF. . . . West Coast Engine Equip. Co.
PHOENIX, ARIZ. . . . . Stapley's

Pennsylvania Crusher Division, Exclusive Licensed Eastern Manufacturer and Distributor, 323 S. Matlack St., West Chester, Penn.
Armstrong Whitworth (Metal Industries) Ltd., Authorized Licensed Manufacturer and Distributor. Close Works, Gateshead-upon-Tyne 8, England

. . . for more details, circle No. 55 on Reader Service Postcard

enough to allow the lined plate to dip into the oil. Drainage was through a 1-in. flexible hose to the engine pan on the right side of the engine. No noticeable drop in oil pressure was evident, and this change-over has been in operation for the past year.

Otis H. Fox of Cox Bros. Construction Co. had a problem with the model 27 Cat power unit used on a DW 21. It would continuously overfill with grease and then the grease would get in the clutch. Replacing the seal several times proved unsuccessful.

He solved the problem by noting that the power unit has a vent breather hole that opens to the inside of the differential case on the DW 21 in forward motion. The ring gear would throw grease in the breather hole and would cause the overflow of grease. Removing the power unit and tapping a ¼-in. pipe thread in the breather hole, then screwing a ¼-in. elbow in the tap hole leaving the opening downward did the trick.

Truck diesel air problems

(From General Petroleum Corp.)

THE AMOUNT of power that can be developed by a diesel engine is limited by the weight of air it takes in. Some 12,500 gal. of air is used per gal. of diesel fuel burned. (The gasoline engine needs some 9,000 gal. of air per gal. of gasoline). Over 1 gal. of water is formed for each gallon of fuel burned.

A naturally aspirated Cummins diesel may be expected to lose 3% of its hp. for each 1,000 ft. rise in elevation due to the lesser weight of the same volume of air drawn into the diesel. Turbo-charged engines do not lose hp. at higher elevations because as the air becomes less dense there is less resistance offered by the compressor wheel; therefore, the exhaust turns the common shaft faster thereby maintaining about the same intake manifold pressure as at sea level.

The life of a diesel engine is primarily dependent upon the amount of dirt taken into the engine. 8 oz. or 1 cupful of typical road dirt will wear out an engine. If this amount of dirt is fed into a new engine in 1 day, then that engine will wear out in 1 day. If precautions are taken to allow this amount of dirt

o enter in a year, then the engine an be expected to not wear out or 1 year.

Three major sources of dirt entering an engine are:

1. With the intake air
2. With the fuel or lubricating oil
3. Left in the engine during manufacture, rebuild or repair.

An air cleaner should offer minmum resistance to air flow to the ngine. Usually the truck or equipment manufacturer supplies the air leaner rather than the engine manufacturer, and all too frequently elects a cleaner of marginal capacity in order to keep costs down.

Most destructive dirt

About 15 to 20 microns dirt size s the most destructive to an engine. 1 micron equals thirty-nine milionths of an inch, .000039", or .001 illimeter.) Dry type air cleaners re usually 99% to 99.6% efficient hile oil bath type air cleaners nder favorable conditions are 98% o 99.2% efficient. An oil bath type ir filter is not efficient at low engine rpm., as the velocity of the ncoming air is not sufficient to ick the oil up out of the bowl and arry it into the separating screens.

An oil bath type air cleaner may hannel, particularly under high acuum, thereby reducing its effiiency. Also, it is almost impossible o determine when the filter is irty. New oil bath type air cleanrs have been found to have the alvanized inner-screens largely locked off by zinc, thereby offering too much resistance to air flow ven when new. Some dry type air ilter paper disintegrates when wet, r blocks off the flow of air. Howver, most dry type air cleaners are asily cleaned by directing an air ose on the inside of the element, hereby blowing the dirt off the utside.

Most present day dry type air leaners may be immersed in a suitble container of detergent soap nd water and effectively cleaned y bubbling air from the inside of he element.

Cummins specifies an intake vacum of 21 in. of water maximum or the naturally aspirated, supercharged, and turbo charged enines.

The turbo charged engine using il bath and a dry type cleaner in eries may not exceed 34 in. of ater vacuum to the turbine. (Actually the performance of the enine is not materially affected until

(Continued on page 117)

NEW LITERATURE

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

Catalog on welding equipment

Harris Calorific Co. has published a 34-page illustrated catalog covering all phases of the gas welding and cutting business. Included in the catalog are welding torches and tips, cutting torches and tips, regulators, and welding and cutting accessories. There are also specification sheets to meet all types of gas welding and cutting requirements. The catalog is well illustrated and laid out and includes a handy price list.

. . . Circle No. 160

Designing water tight concrete

A factual summary of authoritative thought on the design and specification of water-tight concrete is given in a 6-page folder available from **The Master Builders Co.** Discussion covers the basic requirements for water-tight concrete and how Pozzolith reduces permeability, shrinkage, bleeding and segregation to produce strong durable structural concrete that is highly resistant to the penetration of water. Graphs and charts are given on the subject of concrete design, along with a suggested specification for obtaining water tight concrete.

. . . Circle No. 161

Lightweight generator set

Highlights of design, engineering and construction features of the recently introduced **Allis-Chalmers** G-226 portable lightweight generator sets, are covered in a new catalog now available from the Engine-Material Handling Division. Sketches show applications of the unit and cutaways and photographs illustrate the newest components of the equipment. Specifications of the basic generator set are given. *. . . Circle No. 162*

Static and vibratory rollers

Two descriptive folders illustrated with on-the-job photos showing various uses of 1 and 2-ton rollers have been released by **Rolcor, Division of Rosco Mfg. Co.** One features the Rollpac, a 1-ton static type roller. The other describes a 2-ton vibrating roller, the Vibrapac. The literature on each fully describes the units, complete with specifications. *. . . Circle No. 163*

Lorain 7-8 ton truck crane

The many features of the Lorain 107, a 7-8-ton truck-mounted crane, are explained in a 12-page catalog produced by the **Thew-Shovel Co.** The Model 107 is a superstructure which is available for mounting on commercial carriers. Hydraulic controls, uncluttered design, many anti-friction bearings, a precision boom lowering device and the patented Lorain square-tubular-chord crane boom are a few of the features described. *. . . Circle No. 164*

International Payscraper

Operating features of the **International** 75 and 55 Payscrapers are detailed in a 16-page, 2-color catalog just released. The 75 has a 20-cu. yd. heaped capacity and is powered by 262-hp. turbo-charged diesel engine. The 55 heaped to capacity is 14 cu. yd., and is powered by 175-hp. engine. The many features of the two machines are carefully explained with photographs and drawings, and complete specifications are given for both.

. . . Circle No. 165

Hardsurfacing welding materials

A 4-page bulletin just published begins by listing 101 wear points where hardsurfacing can save money for contractors. The folder is published by the **Rankin Manufacturing Co.,** which manufactures the Ranite hardsurfacing welding material line. Described is a check list available from the company which results in a regular systematized plan for maintaining nonlubricated surfaces of parts.

. . . Circle No. 166

Hazard lighting catalog

Comprehensive information on the uses and maintenance of portable hazard-warning lighting equipment is included in the illustrated catalog announced by the **R. E. Dietz Co.** The 3-color publication shows the full line of kerosene lanterns and highway torches as well as the recently developed transistorized warning flashers. Special sections cover Dietz railroad lanterns and the Comet electric lanterns. Detailed product specifications include dimensions, burning time, and candle power. Photos and instructions explain proper uses and maintenance of the various warning lights. *. . . Circle No. 167*

How to gang vibrate deep slabs

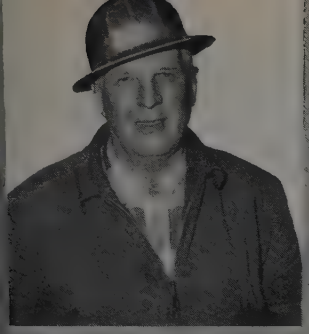
A bulletin has been published on deep slab internal gang vibration. It gives complete information on electric vibrators, mounting frames, brackets and generators. It is illustrated with on-the-job photographs of the assembly with 10 vibrators for 25-ft. width slab on an airport runway. Complete information is given for selecting the right combination of components for any width slab. **Stow Mfg. Co.,** *. . . Circle No. 168*

World's largest portable compressor

A specification sheet describing and illustrating what the manufacturer calls the world's largest portable rotary air compressor is now available. The spec sheet describes the **Le Roi** 12200RD2, a 1,200-cfm machine. Specifications include those of the compressor, engine, general specifications, weights and dimensions. Performance data are also listed. *. . . Circle No. 169*

The story of technology

Here is a manual that won't save you a penny but will provide several minutes of very interesting reading. It is called the "Story of Technology" and is published by **E. I. Du Pont de Nemours & Co.** It covers the full sweep of man's technological history, from the construction of the pyramids to research in modern chemical laboratories. It stresses the role of the large corporation in today's industrial technology. Photographs run all the way from primitive stone-age tools to the 4-level interchange



"We build Sewage Treatment and Water Filtration Plants"

"I build Industrial and Commercial"

"We are building Bridges and Overpass Structures"

"Schools are our specialty"

Each has CONCRETE FORMING PROBLEMS....
ALL are *Profitably* solved
by renting UNI-FORM Panels

Whatever the type of job....it will pay you to investigate the **UNI-FORM** *Rental "Package" Plan*

INFORMATION Send us a set of plans for a job you're bidding. From these, our Engineering Department will tell you:

1. Total form contact area in square feet
2. Total square feet of forms required
3. Number of ties required
4. Forming recommendations

PLUS a complete proposal, advising what it would cost to rent the complete UNI-FORM "Package" for the job.

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SERVICE When you rent UNI-FORM Panels, you get, at no extra cost, the services of Universal Engineers—experienced concrete forming specialists—who provide complete job details, job-site service.

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in Los Angeles. Drawings include old wood cuts and a full color painting by Rembrandt.

. . . Circle No. 170

Fir plywood in construction

A 12-page booklet entitled, "Fir Plywood for Today's Construction" is available from the **Douglas Fir Plywood Association.** The booklet presents data on the physical properties of fir plywood, a chart of the characteristics and proper use of each grade of interior-type and exterior-type panel, a table of basic FHA requirements for plywood construction, and gluing and nailing recommendations. Design and use data for various concrete forms are given. *. . . Circle No. 171*

Line of tire valve products

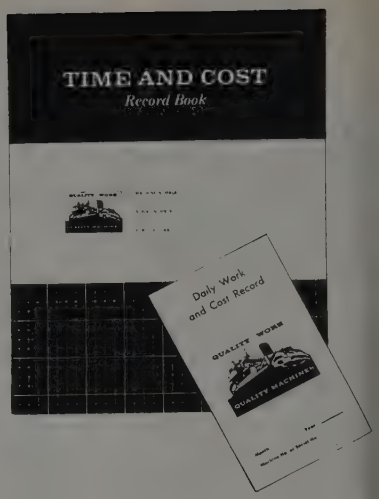
A 16-page catalog illustrating and describing a complete line of tire valve products for off-the-road equipment has been published by **Dill Manufacturing Co.** The booklet, one of the most complete ever offered for products of this type, covers such items as valves, valve insides, caps, fittings, tire gauges, couplings, hose assemblies, valve tools, tread gages, and vulcanizing equipment. Each product classification contains illustrations, detailed specifications, application information, and where applicable, mounting instructions. *. . . Circle No. 172*

Universal vibrating screen

An 8-page bulletin describing a horizontal vibrating screen which "floats on air and rubber" has been published by the **Universal Engineering Corp.** The various features of the machine, phasing bars, air springs, and rubber bushings, are very clearly explained with the aid of cut-away drawings and photographs. Full specifications, dimensions and a screen capacity chart are given. *. . . Circle No. 173*

Cost record book

To assist owners in determining the cost of owning and operating equipment, **Caterpillar Tractor Co.,** has prepared a 24-page monthly time and cost record book. Twelve sets of pages are included on which to record, day by day, each month individual machine expenses for an entire year. At the end is a summary sheet where the totals for each month can be entered to obtain annual cost figures.



Spaces are provided for recording both the quantity and cost of diesel fuel, gasoline, lubricating oil, grease, filters, hydraulic oil, repair labor, and operators' time. There is also a space for the type and amount of miscellaneous costs, such as transportation, tires, and tire repair. Other columns are "machine hours worked", "type of work" and "repairs".

In order to record expenses as they occur in the field, a pocket-

size daily time and cost-record booklet is also available. Periodically the figures may be transferred from the daily to the monthly cost book.

. . . Circle No. 174

High strength bolt chart

A large wall chart is available which shows the proper procedure for installing high strength structural steel bolts. Measuring 17½ x 22 in. when unfolded, the chart covers the installation procedures in four steps: surface conditions, washers, wrench calibration, and impact wrenching. Identification of high strength bolts is explained and a bolt tension chart is given. The chart is designed so that it can be fastened to the wall of a field office or folded and carried up on the job. Publisher of the chart is **Republic Steel,** Bolt & Nut Division.

. . . Circle No. 175

Facts on ice control spreader

Literature on the Model CF skid-mounted ice control spreader, which can move from storage to spreading in 15 min. is now available from the manufacturer, **Highway Equipment Co.** The spreader can be loaded on any dump truck with a crane or hoist in minutes whenever ice or sleet storms threaten to tie up traffic.

. . . Circle No. 176

Colored safety hats

Colored safety hats which quickly identify the classification of the wearer are now available from **Mine Safety Appliances Co.** The Skullgard hats, available in nine colors, are described in a newly offered folder. The color finish is a chip-proof epoxy paint chemically bonded to the shell.

. . . Circle No. 177

Air for diesels

(Continued from page 113)

the vacuum approaches 40 in. of water.)

Intake manifold pressure on the following Cummins engines should be: (in inches)

JT	165 HP	17 - 20 Hg
JT	175 HP	28 - 30 Hg
NT	235 HP	12 - 15 Hg
NT	250 HP	14 - 15 Hg
NTO	262 HP	17 - 20 Hg
NRT	300 HP	25 - 26 Hg
NRTO	335 HP	28 - 30 Hg

(Hg is mercury)

Exhaust back pressure on the Cummins naturally aspirated engine should not exceed 1 in. Hg and on the supercharged and turbo charged engines, should not exceed 1½ in. Hg.

All earlier model Cummins engines and even some present production vent the crankcase by running a piece of tubing from the valve cover to the air intake, thereby keeping the crankcase under a slight vacuum. Air leakage at the oil fill spout, dipstick, or improper seating gaskets allows dirt to be drawn into the engine.

Crankcase pressurizing is desirable on all supercharged or turbo charged Cummins engines and is strongly recommended for all dusty operations.

Some engines are equipped with an oil bath crankcase breather mounted on the top of the valve cover. This should be serviced at regular and frequent intervals. Some engines are fitted with a crankcase ventilator mounted on the valve cover which contains a neoprene ball to control crankcase pressure. In practice, this ball frequently becomes coated with contaminants and fails to function, therefore most operators remove the ball.

Tuffy® Wire Rope Tips

Guard Against These Killers!

... Get The Full Measure of Service-Life Built In By Wire Rope Specialists

Mangled in a Wedge Socket

Here's a result of improper socketing. It was caused by using a poorly designed or worn-out wedge socket. Failure at the dead end can damage other sections of the rope, too.

Rusty Road to Ruin

Rust—No. 1 enemy of steel—take heavy toll in wire rope life. An sidious, silent type of killer, often does irreparable damage be it's even noticed. The one-str break shown here resulted when rope was allowed to become r bound through lack of lubricat Tests show that, with other co tions ideal, properly lubricated has up to 10 times the life exp ancy of dry rope.

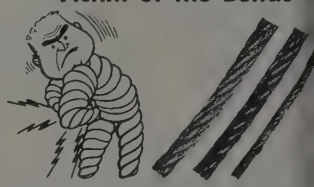
Tuffy Balanced Scraper Rope

"Balanced" construction makes it flexible enough to withstand sharp bends, yet stiff enough to resist looping and kinking when slack. Also gives higher resistance to the shock of load impact on slack line. Moves more yardage per foot because it's specially built to take the beating of drum-crushing abuse.

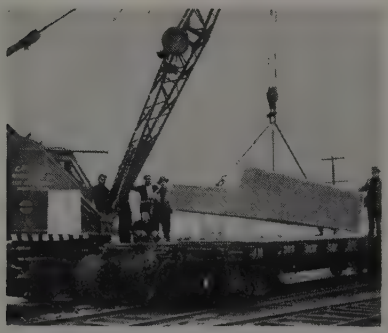
Overloaded — Soon Exploded

The rated capacity of a wire rope is based on the breaking strength (catalog) divided by a safety factor applicable to the type of service or use. The grade of steel, type of construction and size of the rope determine tensile strength. It must be properly related to the loads it will carry, or costly and dangerous early failures are likely to occur.

Victim of the Bends



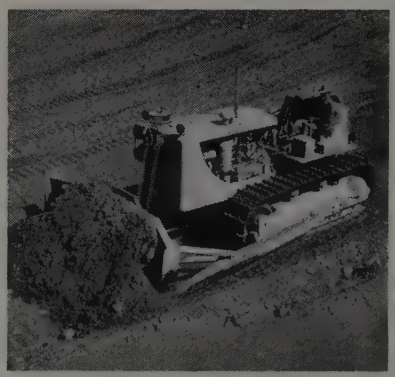
Excessive bending of wire rope celerates wear. Generally, more f ible ropes are used as bend stresses increase (with decrease tread diameter of sheave or dru If a rope is operated on a sheave small for its bending characterist early failure is certain. Through exhaustive series of bending te Union Wire Rope engineers h compiled data that you can use assure getting the rope construct that will give you the longest se ice life. Ask about it.



Tuffy Balanced Slings & Hoist Lines

"Balanced" because they combine strength, flexibility and toughness in the proper relationship to do a better job longer.

Tuffy Slings and Hoist Lines are a top-performing team in every type of materials handling. The slings are made of a patented, machine-braided fabric that's next to impossible to knot or kink. The hoist lines are a special construction in which strength, flexibility and toughness are balanced.



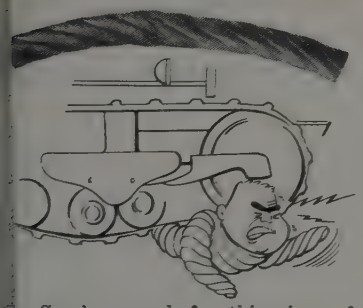
Tuffy Balanced Dozer Rope

Built to give you longer service with less downtime. Mounted on your dozer, a 150' reel of ½" or 9/16" can give you a big bonus of extra service. Here's how: when rope shows drum wear or is crushed on the drum, you feed through just enough to replace the damaged part. You save the 40 to 50 feet ordinarily thrown away. Also available in 300' and 500' reels.

Tuffy Balanced Dragline Rope

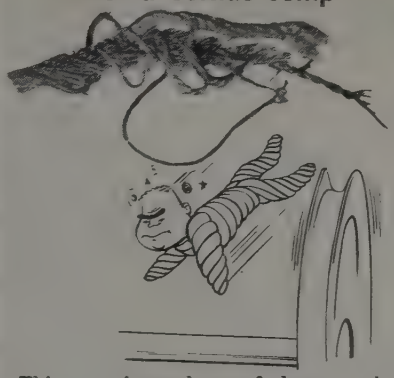
Here's highest abrasive resistance with super flexibility. Better spooling. Smoother riding on grooves Tuffy Dragline Rope hugs the drum whe ing for full load. Gives you longer life, consistent dependability, in handli material — wet or dry dirt, sand, grave cement or minerals.

rushed by a Tractor Cleat



e Sunday punch for this piece of re rope was delivered by a tractor eat—just one of many crushing juries caused by rope being run er or banged into by hard, sharp jects. Even the toughest wire rope no match for this kind of mis-eatment.

After a Suicide Jump

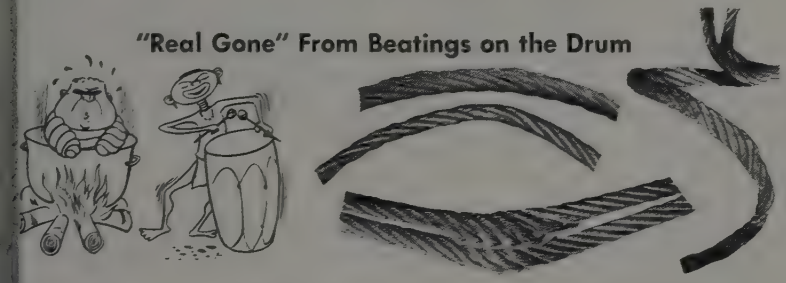


This rope jumped out of sheave and was soon destroyed by pulling around the shaft. Actually it was a case of sudden slack which threw the rope out of the sheave.

Burned on a Frozen Sheave

End of the line came quickly for this rope as the result of operating over a sheave that did not turn. Note the exceptionally heavy abrasion on one side of the rope. Sheaves should be checked thoroughly and often.

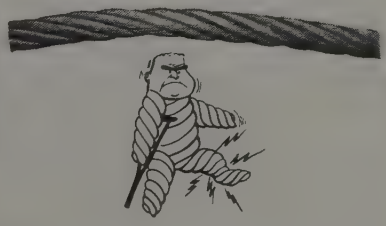
"Real Gone" From Beatings on the Drum



ven under normal operating con-tions, drum wear gives wire rope vere punishment. This wear con-ntrates at the cross-over points nd at the flange. Excessive drum rushing results from operating on nall drums, excessive loading and oor winding. Smooth drums are not ecommended. Here are typical drum beatings": Cross-over wear; ross-over crushing on drum; drum crushing from poor winding; drum-crushing from small drum.

Although drum wear cannot be eliminated, its effects can be greatly reduced. Under properly engineered procedures, two and three times the service can be obtained from the same line by improving drum conditions. Union Wire Rope Engineers will help you with this problem. Get in touch with us for information.

On the "Blink" from a Kink



This open kink resulted from mishandling of rope. Guard against kinks by proper winding on the drum. Never pull a loop smaller. Always enlarge it, then straighten out the rope.

Strangled by a Misfit Sheave

When the bearing surface of a sheave is too small for the rope diameter, pinching action quickly destroys the rope — especially when it's overloaded. The victim shown here was knocked out in just 1½ hours of service.

Wire Ropes are "Job Prescribed"—Each Designed for a Particular Type of Machine

are thousands of wire rope constructions and Union Wire Rope specialists them all. But, there is only one Tuffy line of wire ropes. Each Tuffy was ped and proved the one best rope for the particular work for which it is ed. It is designed as a functional part of the type of machine on which sed.

Wire Ropes are "job prescribed" and balanced in each prescription are e ingredients of strength, flexibility and toughness to give you genuine from inefficient operation, foreshortened service life and safety hazards. et longer service life and you cut down on your rope costs. Union Wire Corporation, 2146 Manchester Avenue, Kansas City 26, Missouri.

Your Tuffy Distributor Can Help You Get The Full Measure of Service Life

UNION Wire Rope

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products

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

NEW EQUIPMENT

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

Chevrolet announces new models

An optional power train of new design for its heavy duty trucks and a wider range of optional equipment with numerous engine and chassis improvements feature the 1959 **Chevrolet** truck line. Total number of models now offered is 139 on 22 different wheel bases. The maximum gross vehicle weight is 36,000 lb.

The following comments will be restricted to the heavy duty line, as having most direct interest to the

construction field. A highlight feature of these models is a new optional power train of: 185-hp. engine, heavier clutch, close ratio 5-speed or Powermatic transmission and a 16,000-lb. single or 30,000-lb. tandem rear axle. This combination produces 12% increase in pulling power. The new 5-speed transmission on these heavy duty models has a closely-stepped shifting pattern providing high performance. The 5-speed conventional ratio transmissions are optional. Special improvements have been made to increase the durability and sealing of rear axles. Higher capacity generators are available on all 1959 models as optional equipment at 40 and 50-amp. output.

. . . Circle No. 178

New models by Curtiss-Wright Corp.

A new model of self-propelled 2-axle scraper has been added to the line of earth-moving equipment produced by the South Bend Division, **Curtiss-Wright Corp.** The model designated CW-220 is rated at 20 cu. yd. struck and 27 cu. yd. heaped. Power is pro-

vided by a 375-hp. General Motors diesel through torque converter and automatic transmission. The unit not only incorporates all existing features of the Curtiss-Wright line but has the added advantage of being interchangeable with a 35-ton rear dump hauling unit. At the same time Curtiss-Wright announced model CW-226, a larger unit with a struck capacity of 26 cu. yd. and a heaped capacity of 36. This model features a Curtiss-Wright Roto-Gear steer providing instant response and control throughout a 180-deg. turn.

. . . Circle No. 179

For matching joints between lanes

Matching longitudinal joints in multi-lane bituminous paving, **Blaw-Knox Company** has introduced an attachment which carries out this operation automatically. This new hydraulically operated attachment is designed for use with the Blaw-Knox PF-90 bituminous paver finisher. It produces high quality control and eliminates continual observation and ad-

NEW S-12

joins Euclid Rear-Dump Line!

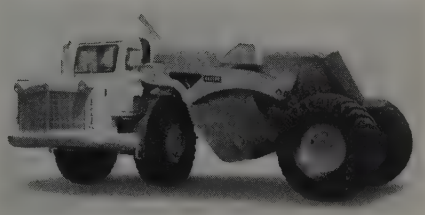
The Model S-12 Euclid-Easton hauler—with payload capacity of 44,000 lbs.—is a new size Euclid over-hung engine type semi-trailer rear-dump. Designed and built as a complete, balanced unit, it combines the experience of two leading manufacturers of hauling equipment for mines, quarries and heavy industrial and construction work.

With 218 h.p. and 5-speed gear transmission the S-12 has a fast travel speed and ample power for the toughest jobs. Big 24.00 x 25 tires on all wheels provide traction and flotation for operation under conditions that would stop other haulers. For work in close quarters the 90° hydraulic steering and variable wheel base gives the unit exceptional maneuverability and helps cut cycle time.

Well reinforced body is constructed of special alloy steel to withstand the impacts of shovel-loaded rock and heavy excavation. Single stage double-acting hoists raise the body quickly, with smooth positive control all during the dumping cycle.

Have your Euclid dealer show you how this Model S-12, or the 12 and 35 ton semi-trailer models with 143 and 325 h.p., can cut hauling costs. He'll be glad to tell you about other Rear-Dump "Eucs" of 10 to 50 ton capacity, too.

22-ton capacity
14 yds. struck
218 h.p.
24.00 x 25 tires
22.6 mph top speed



Euclid semi-trailer rear-dumps are available in 3 capacities—12, 22 and 35 tons with 143, 218 and 325 h.p. Tractors for these models are interchangeable on 7, 12 and 21 yd. scrapers.

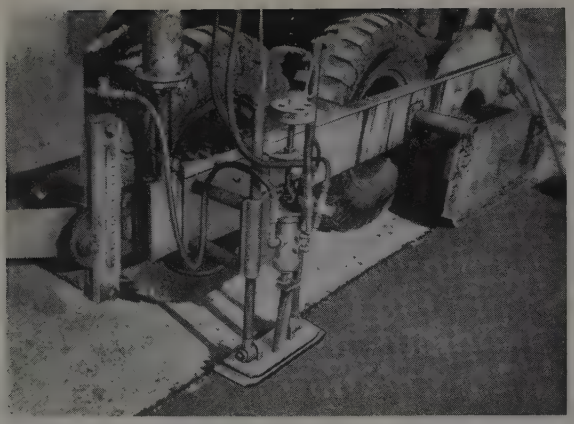
EUCLID Division of General Motors Corp., Cleveland 17, Ohio

. . . for more details, circle No. 63 on Reader Service Postcard

GM GENERAL MOTORS EUCLID

EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE



justment required by manual screed adjusting mechanisms. The thickness of the bituminous course is matched exactly by the attachment to the elevation of the adjacent lane. The control unit can be mounted on either left or right screed arm and connects to the machine's hydraulic system with a quick change coupling. The tracking mechanism actuates a 4-way hydraulic valve which controls the screed arm position.

. . . Circle No. 180

Medium weight; heavy duty production

Expanding its line of construction machinery, **Allis-Chalmers** has added the Model 145 motor grader, designed to meet demands for a unit in the medium power and weight classification that is able to perform heavy-duty work. Weighing 21,540 lb. and with 80-hp. engine, the new model increases the Allis-Chalmers line of graders to three, with the smaller 55-hp. model and the heavier 120-hp. model. The new unit is a tandem drive, powered by A-C diesel engine and has 6 forward speeds up to 20.3 mph. and three reverse speeds up to 7 mph. Other design features include a

high clearance under the front axle for handling big windrows of material. The machine provides a 90-deg. angle for bank cutting with its 12-ft. moldboard and has a power-actuated, fully reversible circle turn. Special attention has been given to operator comfort and safety. A wide range of attachments, including heavy duty scarifier and snow plows are available for the model.

. . . Circle No. 181

Low-bed trailer announced by IH

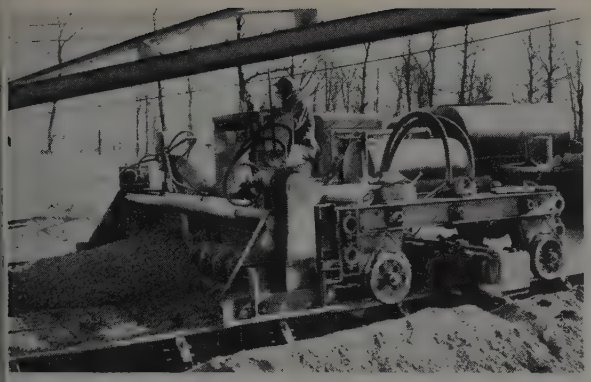
Rated at 13,000-lb. capacity a 6-wheel low-bed trailer has been introduced by **International Harvester Co.** Identified as International No. 130 low-bed trailer, the unit is designed for contractors and equipment dealers. It is equipped with rubber-mounted torsion

axles which act as a combination spring and shock absorber, independent oscillation of each wheel enables smooth movement of the trailer over rough terrain or at highway speeds. A ramp is provided for fast one-man loading and unloading. A jack built into the hitch allows the trailer to be loaded when the towing vehicle is disconnected, and also facilitates connections. Electric brakes are offered as optional equipment.

. . . Circle No. 182

Spreader with many adjustments

To handle today's concrete highway work, with its many variations in width, crown and superelevation, **Jaeger** has announced a new spreader. Designated the Jaeger Type JSX it provides all adjustments necessary to handle these design requirements. Operations in-



cluding traction, spreading, screed and change in width are all powered by hydraulic motors. Dual spreading screws, independently controlled, rework the concrete for uniformity and compact it against subgrade and side forms.

Width adjustments are from 12 to 18 ft. and can be made without stopping forward or reverse movement. The spreading screws also extend to the 18 ft. width. The JSX spreader eliminates need for a second finishing machine if not required by State Highway specifications. *. . . Circle No. 183*

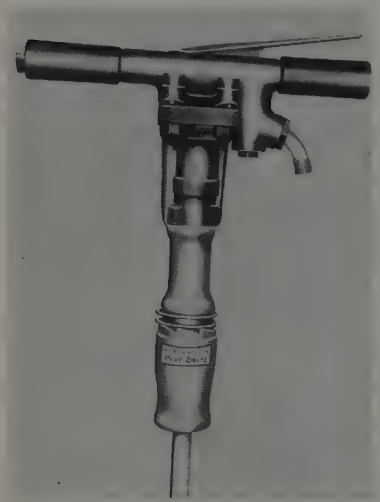
Roller with dual operator controls

Designed for many job applications in the highway field, **Buffalo-Springfield** announces a self-propelled pneumatic tired roller, a 7-wheel unit designated Model PSR-30. The unit is particularly suited to subbase, base and asphaltic concrete compaction but is

also recommended for earth dams, highway fills and airports. A special transmission which includes torque converter, offers an infinite range of rolling speeds up to 19.4 mph. Power from a 125-hp. Cummins Diesel operates through the differential to a final drive gear on each wheel pair. The dual operating controls are of the automotive type with hydraulic steering. Operators' seats are left and right hand and can swivel 360 deg. Engine controls and instruments are located on the engine hood convenient to the operator. Two brake systems are provided. Wheel loads can be varied from 3,340 to 8,600 lb. per wheel through change in ballast. All wheels oscillate. *. . . Circle No. 184*

Light weight paving breaker

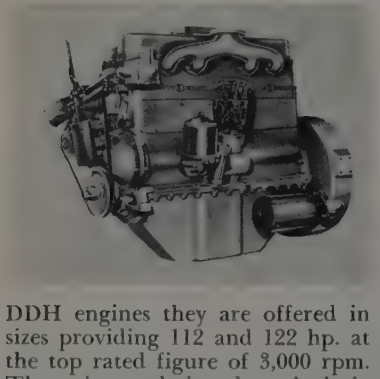
For all types of work which require a light weight pneumatic tool, **Worthington Corp.** is offering a 24-lb. paving breaker. The tool is equipped with a rubber buffer type retainer and provides a front end



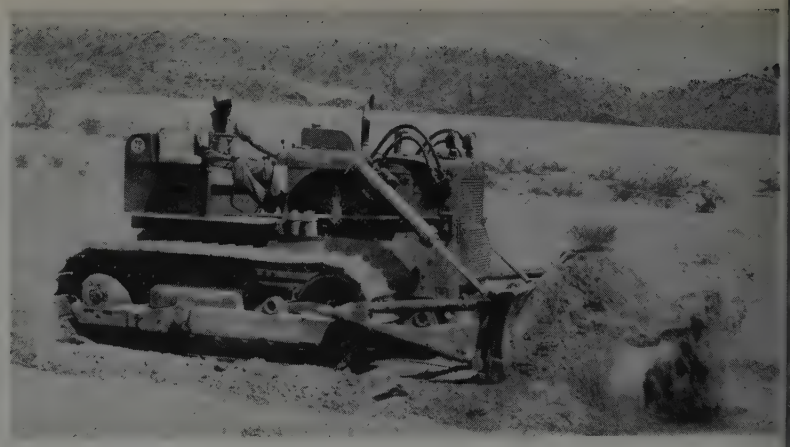
with smooth contour making it easy for the operator to handle on sidewall work. Another feature of design is the passing of the exhaust air in the front end which keeps the tool from overheating. Designated the WB-24, all finished parts are blue coated to match the Blue Brute line. . . . *Circle No. 185*

Diesel operates at 3,000 rpm.

Designed for applications requiring speeds of from 1,800 to 3,000 rpm., **Hercules Motors Corp.** has brought out two 6-cylinder diesel engines. Designated as the new



DDH engines they are offered in sizes providing 112 and 122 hp. at the top rated figure of 3,000 rpm. The units are designed particularly for truck service where hydraulic torque converters are used requiring engine speeds of about 2,200 rpm. for efficient operations. They are especially applicable where light weight of the engine and small size are desirable. . . . *Circle No. 186*



IH adds diesel crawler tractor

With several "firsts", **International Harvester Co.** introduces the TD-15. At 105 hp. with a 6-cylinder engine the TD-15 represents higher power output than others in the medium-size tractor field. The tractor has all-weather push button gasoline conversion starting and features aluminum alloy pistons fully counter-balanced crankshaft and twin plunger I-H injection system.

An important feature is the advance in handling ease which provides a new 6-speed, single-stick full reverse transmission. With a single lever the operator can shift the transmission through any of its 6 speed ranges.

Greater stability is secured with 6-roller track frames and new 1,000-hr. bushing type track rollers lengthen the maintenance interval. The tractor has a full line of matching attachments available.

. . . *Circle No. 187*

Paver on crawlers, moves on rubber

With several new design features, **Barber-Greene** has introduced a new asphalt paver which works on crawlers for maximum flotation and traction, and can be hauled from job to job on rubber tires. This is the Model 873 Asphalt Finisher. Laying widths are from 6 to 12 ft., and depths are up to a 3-in. mat. The new unit has been designed to provide a high quality product for some of the smaller applications such as drive-ways, parking lots, filling stations, etc. Contractors have already discovered that the unit can be used equally well for such jobs as paving shoulders, turn-outs and other accessory areas along freeways.

The machine was placed on crawlers since much of its work will involve unstable, soft, or slippery ground where maximum traction will be required with minimum loads. However, this general type of work also requires frequent moves from job to job. To provide such mobility, Model 873 is equipped with power operated, retractable tires and a towing tongue which may be placed or removed in a matter of seconds. When the machine is up on its wheels, having raised itself hydraulically, it is ready for transport over the highway at speeds up to 30 mph. This unit offers the same tamping, leveling and thickness control principles incorporated in the Barber-Greene larger model. . . . *Circle No. 188*

Stability and capacity

Combining superior stability with a lifting capacity of 100 tons on a 60-ft. boom at 15-ft. radius, **Harnischfeger Corp.**, announces its new P&H Model 1010 crawler erecting crane. The unit is in the 2½-yd.

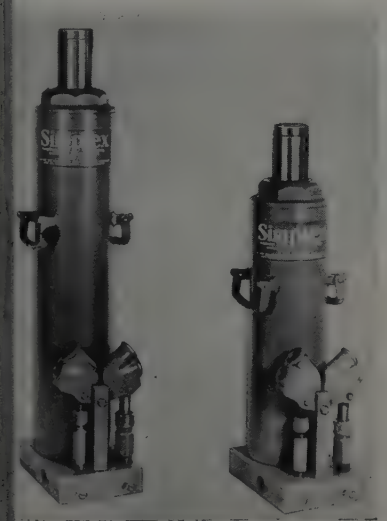
excavator class. The crawler assembly is constructed of alloy steel with rugged integral action extensions. The 16-ft. 10-in. spread provides the stability to handle the 200-ft. heavy duty boom and a light weight boom of 300 ft. for concrete work. Power for the swing is transmitted through the P&H Magnetorque which eliminates friction clutches with necessary replacements and adjustments. The machine is less than 13 ft. high with gantry in folded position and less than 12 ft. with gantry removed.

. . . Circle No. 189

Two new simplex jacks

With a rated capacity of 25 tons and equipped with both high and low speed pumps, two new high-lift hydraulic jacks have been added to the Simplex line by **Templeton, Kenly & Co.** One model (25H28) has a closed height of 28 in. and a 22-in. lift and weighs 125 lb. The other model (25H22) has a closed height of 22 in. and a 16-in. lift and weighs 105 lb. Both models are designed to lift 50% over rated capacity and may be operated in either vertical or in horizontal positions.

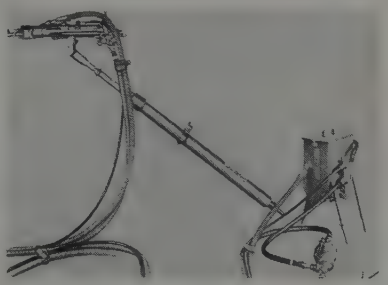
. . . Circle No. 190



Dust collector on drill

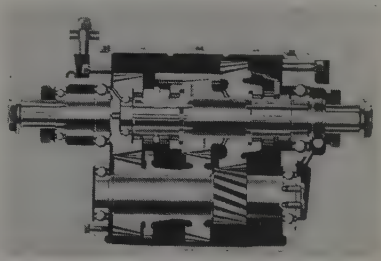
In arid locations, tunnel drilling can be carried out dry and dustless with the Jack Leg Drill of **Le Roi Division, Westinghouse Air Brake Co.** Dust collector tank has been approved by the U. S. Bureau of Mines. The new collecting feature is designed for use with the Le Roi AL90 and AL92B air legs. Cuttings are drawn into 5-hole bits through the hollow drill steel, down into the chuck and immediately out the side of the housing. Operating at 80 psi., the air consumption is 105 ft. The tank collectors weight 45 lb. and are 13 x 7 x 16 in. in size.

. . . Circle No. 191



Auxiliary transmissions

Expanding its line of 3-speed auxiliary transmissions, **Fuller Manufacturing Co.** has added nine new sets of gear ratios designed particularly for use in construction and other heavy duty equipment. These transmissions are intended to provide the widest range of gearing options at lower prices. Splitting existing ratios, the new drives permit



Subgrader for heavy highway work

Designed especially for heavy highway construction jobs and airport work, **Standard Steel Corp.**, has a new subgrader built to make cuts to 30 in. in depth with widths up to 25 ft. Identified as the Standard "Deep-Cut" Subgrader the machine is of extra heavy construction. Fewer side forms for the slab are required when this machine is used since subgrading is done at such a fast rate that concrete can be poured the same day and forms reset the following day. Control of the grade is assured with accuracy to within ½ in. Twin augers mounted at 45-deg. angles bring the material from the roadbed to a rubber conveyor belt. These augers may be stopped by the operator and excess material allowed to accumulate if a low grade is ahead. The augers may also be reversed, individually or together and low grades filled in. Adjusting screws on the four corners of the machine can be preset to provide the desired depth of cut and the subgrader may be raised or lowered while in motion. There are only three controls: two for handling the augers and a third to control the raising or lowering of the machine for varying grade. A single diesel tractor will pull the grader.

. . . Circle No. 192

engines to operate at maximum power throughout a full range of vehicle speeds. The units offer maximum flexibility where reduction is required for extreme grades or soft footing. The rugged heavy-duty 92 Series (illustrated) has been completed with the addition of five new sets of ratios. ... *Circle No. 193*

Boom based on tetrahedrons

As an exclusive design development, **Link-Belt Speeder** has announced its new Hi-Lite booms are adding 20 to 60 ft. of usable height to former crane boom designs. The new design is a modern adaptation of a tetrahedron, made up of four triangular sides in the strongest figure applicable to boom design. These interrelated units lock all

members into an exceptionally rigid structure, fully braced against loads in all directions. The square tubular chords and round tubular bracings are of high-strength, light weight tubing. ... *Circle No. 195*

Scraper of 38 cu. yd. capacity by M-R-S

With a 38-yd. struck and 48-yd. heaped capacity, a new unit has been added to the **M-R-S Manufacturing Company's** line of excavating equipment. The new unit consists of the M-R-S 250 tractor and the hydraulic powered M-R-S 250 HW Scraper, in a combination designed for high production and minimum cost per yard. The 600-hp. power plant can handle the big scraper at speeds up to 34 mph. with reserve power for handling grades. With large, low pressure drive tires, the tractor is able to be of substantial assistance to the pusher in loading the scraper in minimum time and distance. The 4-wheel tractor makes for easier operating and the new semi-automatic transmission provides a selection of 9 forward and 2 reverse speeds.

... *Circle No. 194*

Utility screw anchor

Designed to serve a wide variety of uses, a screw anchor has been developed by **Van Dyke Industries.** It is 15½ in. long, weighs 38 oz. and

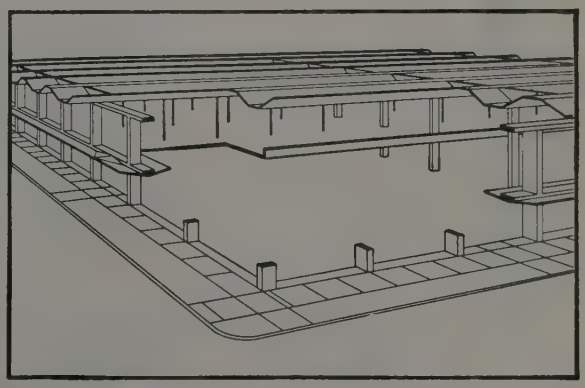
Sears, Roebuck & Company's Tampa store . . .

concrete folded plate roof achieves large, unobstructed floor area

One of the basic requirements here was to achieve unobstructed floor space with economy. Architects Weed, Russell, Johnson & Associates found the answer by using a concrete shell in the form of a folded plate. This construction made it possible to span the entire floor area with only one interior row of columns . . . and suspend the second floor from the roof. The result: 163,715 square feet of *fully flexible* floor space, so important to any retail selling operation.

Folded plate design is, in itself, unique and interesting. And only concrete can give the added boldness of the wide, cantilevered overhang.

It's one more example of the way new uses of concrete are bringing big economies and added vitality to both conventional and modern architecture.



Isometric view showing 125-foot c on c spacing of main columns. Floor slab is supported by 3-inch plates welded together to form a hanger. Hangers are spaced 25 feet c on c.

PORTLAND CEMENT ASSOCIATION

903 Seaboard Bldg., Seattle 1, Wash. • Mezzanine—Placer Hotel, Helena, Mont.
425 Newhouse Bldg., Salt Lake City 11, Utah • 721 Boston Bldg., Denver 2, Colo.
816 West Fifth St., Los Angeles 17, Calif.

A national organization to improve and extend the uses of concrete

FOR STRUCTURES... MODERN **concrete**

. . . for more details, circle No. 68 on Reader Service Postcard

is similar in design to a tapered wood screw. The upper end is an extension of the shank with a hole through which a small rod can be placed to twist the anchor into the ground. The anchor can be screwed in to refusal and average installation time is not more than 1 min.

. . . Circle No. 196

Safety belt for tractors

Designed to increase operator safety and comfort when working in rough terrain, a new seat belt is available for Caterpillar-built, track-type tractors. The special design of the belt provides secure holding and yet allows the operator to disengage the fastener instantly. The fastener connects the belt at mid-point and requires no threading as is common with the buckle-type of seat belt. These seat belt attachments are available for all current and earlier models of Cat-built, track-type tractors. **Caterpillar Tractor Co.**

. . . Circle No. 197

Lasting rust preventive

As a lasting protection against rust on any kind of metal, RUST-KON-TROL has recently been introduced by **Wilco Co. Industrial Division.** Tests have indicated that one application will be permanent for indoor surfaces and will be adequate outdoor protection for an entire year. The material is packed in pressurized cans and is quick and easy to use. No surface preparation is required and its waterproof formula is not affected by weather. RUST-KON-TROL provides a permanent, clear, film that becomes tough and is not brittle at low temperatures.

. . . Circle No. 198

High capacity roll crusher

With advanced design features intended to cut maintenance costs and provide higher capacities of controlled sizes, **Pioneer Engineering** has announced a 4030 twin-roll crusher. The larger capacity results from an increase in the width of the roll face by about 36% and a 10% faster rim speed. As compared to the company's 4022 crusher, the new unit is claimed to develop 36 tons per hour as compared to 24 at ¼-in. maximum size product. In the 1-in. size, the new unit would produce at 143 tons per hour as compared to 95 under normal operating conditions. Power requirement would run between 135 to 160 hp. One of the design features is the hydraulic adjustment for the setting. This simplifies field procedure and makes possible quicker changes to meet required sizes. The crusher measures about 5 1/5 ft. in height with a 14-ft. length and about 9 ft. of overall width. Total weight is approximately 37,000 lb.

. . . Circle No. 199

Improved by field sugge_tions

Incorporating many new features suggested through much field operating experience, the new medium-weight self propelled roller of **Bros, Inc.** (SP-54B) is now available. Ballast range can produce from 3 to 10 tons of compaction load and a new body design increases the operator's visibility for rolling in tight places. The lower center of gravity increases stability on shoulders and

steep grades; full height to top of steering wheel is only 91 in. With torque convertor drive, the improved clutch system and hydraulic steering permit smooth starting and transmission of power through the entire speed range up to 20 mph.

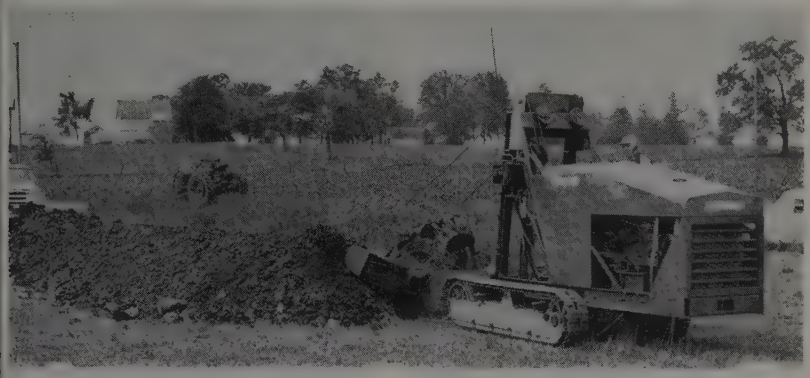
. . . Circle No. 200

Barber-Greene adds ditchers

Smaller, but following the general design of the company's first wheel-type machine, **Barber-Greene** has added two new ditchers, the Models 772 and 773. The B-G ditcher line now includes models of all three types: wheel, ladder and vertical boom. Model 772 digs a maximum of 5½ ft. and offers a range of digging widths from 14 to 24 in. It is designed especially for gas, electric and water lines. The model 773, which is identical in mechanical features, offers wider crawler treads, up to 16 in., providing greater flotation and making it suitable for many other applications. It is particularly suited for larger water lines and oil fields.

A new, all-hydraulic transmission eliminates gear shifting for crowding. Crowding speeds are from 0 to 28 ft. per minute and are completely independent of wheel speed. The mechanical and hydraulic transmissions are placed at the front end of the machine for easier accessibility. The spoil conveyor offers belt speeds up to 630 ft. per minute coupled with wheel speeds.

. . . Circle No. 201



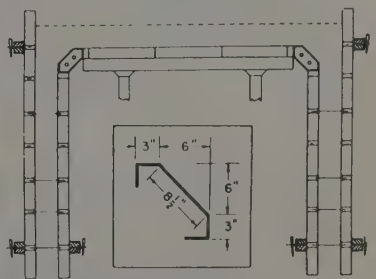
Job Finished 3 Weeks

How to Pour a Tunnel in a Hurry . . .

Symons Culvert Forms The Answer

When awarded a contract to build a 340 ft. tunnel, Schweiger Construction Company, Kansas City, Mo., faced the problem of how to do it fast and as economically as possible.

Symons Culvert Forms solved the problem. They eliminated the need for any special form or job-built construction.



Schweiger used Symons 1″ steel channel filler horizontally on top of 6′ vertical panels on the inside of the walls. Culvert Forms were placed on top of this filler. The forms underneath were stripped with no difficulty and the fillers and culvert forms were then removed without disturbing the decking for the slab, which was left in place for an additional curing period. Walls and top slab were poured monolithically in three pours. *Job was completed in three weeks.*

Symons forms, shores and column clamps may be rented with purchase option. Additional information on *Symons Culvert Forms* is available upon request.

Trailers that telescope

Telescoping to an 8-ft. width for highway travel, the Trailorama units for office or home open to a 15-ft. width at the flick of a switch. Of particular interest to contractors is the mobile office design. Entrances are located on each side of the trailer and the double width eliminates cramped quarters and increases office efficiency. One design provides about 450 sq. ft. of versatile floor space. The same general type of design is available for mobile homes. These home models are also available on special order in 18-ft. widths. Both office and home trailers are the product of **Go Cal Trailer Company.** *. . . Circle No. 202*

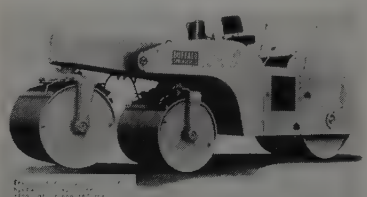
New truck crane for Koehring

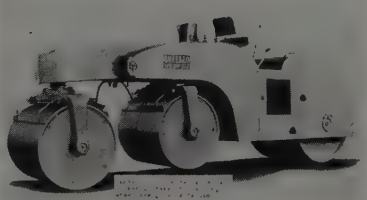
Adding a fifth truck crane to its line, **Koehring** introduces Model 330 with a 30-ton capacity when

working on a 15-ft. radius. Other Koehring truck crane models have 15, 25, 35 and 45-ton capacities. The new model has boom lengths up to 80 ft. for bucket work and boom jibs 15, 20, 25, and 30 ft. long that can be added for unusually high lifts. A new type of connection permits 2-man boom changes on this model and the boom folds at any joint. Total weight is 67,830 lb. and this can be reduced to 46,960 lb. by removal of boom, outriggers, pedestals and counterweight. Top travel speed is 29 mph. and upper machinery can be powered by either gasoline or diesel engine. *. . . Circle No. 203*

Lifts one axle of roller

Providing a hydraulic lift cylinder for the walking beam, **Buffalo-Springfield** has added versatility to its KX-25E, 3-axle tandem roller. By using the hydraulic lifting cylinder it is no longer necessary to depend on the terrain to position and lock the walking beam that carries the guide roll. The operator can now raise or lower this beam as desired. This means that the roller, with the center roll raised, can be used as a 13-20 ton,





2-axle tandem with its long wheel base. This provides a conventional weight distribution of one-third on a steering roll and two-thirds on the drive. By raising the guide roll and by controlling the ballast, the KX-25E can develop equal compression on either roll.

. . . Circle No. 204

Better first aid kits

First-aid kits designed to facilitate emergency treatment through the use of unit-wrapped items, boldly labeled and arranged for quick recognition are just announced by **General Scientific Equipment Co.** Each of the kits has an index on the inside of the lid which shows at a glance the exact location of all items with concise instructions. This index chart serves as an inventory control since all missing items can be quickly identified and replaced. The hinged lids are fitted with a rubber gasket and brackets and handles permit the kits to be mounted on the wall or used in portable service.

. . . Circle No. 205

Piggy-Back Trailer

A trailer that returns empty in a piggy-back position over the hauling unit has been developed by **Person Equipment Co.** The trailer which is suitable for handling all types of bulk materials, including cement, aggregates and asphaltic mix end-dumps and then is pulled into the position shown for the return empty trip. The result is a faster return because of better maneuverability, savings on tires, taxes, fuel, maintenance and better traction on steep grades

or in loose material. There is a factor of improved safety since the unit takes up less road space in this position. The trailer unit is built of either aluminum or high strength steel. *. . . Circle No. 206*

To transfer bulk cement

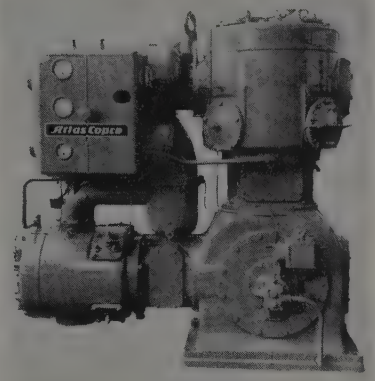
With a capacity of 550 bbl. per hr., **C. S. Johnson Co.** has introduced a plant to transfer bulk cement, which requires a minimum of maintenance. The plant is designed to provide a convenient

method of transferring bulk cement from hopper cars to trailers or dump-trucks. It is easily transported and readily erected on a timber mat where it can be braced with guy wires. Only minor excavation is required. For more permanent installation it can be bolted to a concrete mat. It operates with 12-in. diameter screw conveyor and an all-steel elevator that carries 16 x 8-in. buckets at 16-in. centers. Power for conveyor and elevator is either gasoline or electric.

. . . Circle No. 207

Small size stationary compressor

Delivering up to 835 cfm. at 100 psi., **Atlas Copco** has introduced a stationary air compressor of inter-

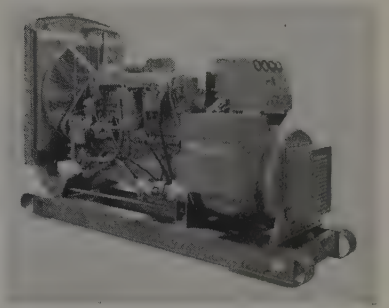


mediate size and compact dimensions. It takes 25% less floor space than other machines of similar capacity. Designated the AR-4, it forms part of the series now available for construction in sizes from 45 to 19,400 cfm. The compressor is 3 ft. 4 in. wide and 5 ft. 5 in. long. It has a gross weight of only 5,610 lb. and can be operated on a skid or as a stationary machine.

. . . Circle No. 208

Onan generating plants

D. W. Onan & Sons, Inc., have announced a complete new series of eight diesel driven electric generating plants with capacities from 50,000 to 200,000 watts. The smallest unit is identified as Series 50DFA and the largest unit is Series 200DWF. The units have been developed especially to meet demands for auxiliary diesel emergency electric power for institutions, industries, utilities and contractors. Most of the units will prove ideal for primary power requirements on construction sites where heavy-duty generating ser-



vice is required. Each plant represents a self contained generating set complete with diesel engine, alternator, exciter and control panel.

. . . Circle No. 209

News of DISTRIBUTORS

Reassignment of responsibilities

Several reassignments of responsibility are announced by Robert R. Carey, president of Inland Machinery Co. of La Grande, Ore. W. Ned Jones, secretary-treasurer of the company, has been assigned as assistant general manager and manager of the La Grande store. Robert H. Carey, who for the past two years managed the Enterprise branch store, has been appointed sales manager.

H. M. "Mike" O'Rourke has been promoted as head of the Enterprise branch. Prior to joining Inland in 1957, O'Rourke was connected with Peter Kiewit Sons' Co. and Rogers Construction Co. as master mechanic. Succeeding to O'Rourke's former post of shop superintendent at Enterprise is Ronald Cruikshank. He has been with the corporation since 1954, principally engaged in the servicing of Caterpillar equipment in the field. In La Grande, Jack Edmondson has been appointed manager of the parts department, replacing Don Guis who left the firm to take up residence in Northern California.

Myers takes on Skil line

Laurence Myers & Co., Inc. of San Francisco, announces the addition of the Skil line of power tools to its already diversified lines of specialized construction equipment. This company, with a branch in Oakland and a sales office in Sacramento, distributes such well known lines throughout Northern California as Waco scaffolding, Jumbo shoring and jacks, Remington stud drivers, chain saws and power tools, Champion saws and blades, Muller mortar and cement mixers, Champion space heaters and concrete finishers, Tusky hoists and Econmobile Hi-Lift.

Grand opening at Wheeler plant

Official opening of Wheeler Machinery Co.'s new plant and office building at 330 West 21st South St., Salt Lake City, took place Jan. 8-9. Said to be the largest and best equipped heavy construction plant in the Intermountain area, it is located on 12 ac., with 70,000 sq. ft. of space under roof and 16,000 sq. ft. of outside working aprons. J. K. Wheeler, president and general manager of the company, says, "I have great faith in our expanded growth here in the Intermountain area and look forward to a very bright future for the use of Caterpillar products in the building of highways, reservoirs, air fields, . . ."

Superior adds two lines

Marion Power Shovel Co. and Vulcan Iron Works, Inc. have been added to the lines of Superior Equipment Co., Phoenix, for distribution throughout the state of Arizona.

Cook Bros. headquarters for Trenchliner in N.W. California

New sales and service headquarters for Parsons Trenchliners in northwestern California is the Equipment Division of Cook Bros. Truck & Equipment Co., Oakland. The new distributorship is headed by Howard F. Cook of Los Angeles as president. Other officers are Joseph E. Hall, vice president, Walter Slater, secretary-treasurer, both of Los Angeles, and Robert E. Pierre, manager in Oakland.

Jacobs-Kerr handles Johnson line

Appointment of Jacobs-Kerr & Co., Denver, as a distributor for the entire state of Colorado has been announced by Harold E. Buckler, sales manager for the C. S. Johnson Co. They will offer the complete Johnson line including automatic plants for highway and airport paving, transit-mix plants, concrete batchers, batch recording systems, elevating chargers, clamshell buckets, Koehring-Johnson mixers, and portable batch plants. Heading the Jacobs-Kerr firm are Robert E. Jacobs, president, and Dave Kerr, vice president.

Thor appoints N. W. distributor

McCraken-Ripley Co., Portland, Ore., has been appointed a distributor of Thor construction equipment division products, and portable electric power tools for building, construction, and industrial applications, as announced by Neil C. Hurley, Jr., president of Thor Power Tool Co. McCraken-Ripley, a 102-year old company, will cover all of Oregon and 13 southern counties of Washington. The new distributorship is headed by W. R. Mannon, president, and D. W. Mannan, vice president and sales manager. Thor's construction equipment division products include vibratory finishing screeds, concrete troweling machines, electric concrete vibrators, and portable generators.

Dorr-Oliver names two Calif. reps

Dorr-Oliver Incorporated announces the appointments of Simonds Pump Co. of Los Angeles and Simonds Machinery Co. of San Francisco as exclusive territorial distributors of D-O pumps. Both firms will stock and service as well as market the complete D-O pump line. The Los Angeles firm will serve construction and industry in the southern part of the state including the counties of San Luis Obispo, Kern, and San Bernardino. From San Francisco, Simonds Machinery will market D-O in the northern portion of California.

Cummins Service & Sales appointment

La Verne Morgan has been appointed shop superintendent for Cummins Service & Sales, Los Angeles, the Southern California distributor of Cummins Diesel Engines, according to J. H. Flanagan, president. He will have supervision over the company's shops at Los Angeles, Bakersfield and Montebello. Joining Cummins Engine Co. in Columbus, Ind. in 1945 as senior test engineer and project engineer in the research laboratories, Morgan was transferred to the Southwest Regional office as service engineer in 1948. Then for two years he was with F. N. Rumbley Co., Fresno, and from 1953 until his new appointment he was with Edward R. Bacon Co. in Oakland.

Massey-Ferguson appoints additional dealers

Appointment of Phillips Auto & Equipment Co., Delta, Colo.; Werth Implement Co., Grand Junction, Colo.; Bauer Equipment Co., Blackfoot, Idaho; and Madison Co-operative Assn., Inc., Rexburg, Idaho, as exclusive area dealers for Massey-Ferguson Industrial Division, Wichita, Kans., is announced by Charles F. Hill, division general manager.

Two new Western Diamond T dealers

Diamond T Motor Truck Co., Chicago, announces the appointment of two new dealers in the West, both of whom have a complete stock of factory parts and excellent facilities for service work. Now actively merchandising the manufacturer's line of heavy-duty motor trucks are: Don B. French and Associates, Walla Walla, Wash., and Diamond T Montana, Miles City, Mont.

Calpacific takes on rubber account

General Rubber Corp., Tenafly, N. J., manufacturer of rubber expansion joints, flexible connecting pipes, elbows and tees, has appointed Calpacific Co., San Francisco, as exclusive distributor for Northern and Central California.

MANUFACTURERS

Byron Jackson elects Dulin chairman, Rose president

E. S. Dulin, president of Byron Jackson since 1929, has been elected chairman of the board, and Andrew W. Rose to succeed him as president and chief executive officer of this division of Borg-Warner. Under Dulin's thirty years of leadership BJ became one of the West's leading industrial organizations, adding to its basic pump and oil tool manufacturing such diversified operations as electronics, rubber products, nuclear equipment, etc. Andrew Rose, who became the fourth president of this 86-year old, California-founded firm, has been vice president and assistant to the president since 1957.

Cat dealers brought up to date

The Arizona Proving Grounds of Caterpillar Tractor Co. was the site of the Phoenix Sales Conference held for top personnel of Caterpillar dealerships in the United States and Canada. Held in two segments, each of two days duration, the purpose of the meeting was to familiarize the group with newest machines in the Caterpillar product line, to outline plans for merchandising, and review the business outlook. More than 280 representatives from 128 Caterpillar dealerships attended the conference. Personnel from Caterpillar's sales, sales promotion, and research departments conducted the conferences and served as host.

Personnel changes by General Tire

Announcement is made by The General Tire & Rubber Co. of the promotion of Arthur E. Wigg to manager of truck tire sales for the San Francisco division. Formerly territory manager at Redding, Calif., Wigg replaces William M. Boyd who was transferred to General's manufacturers sales division.

Also announced is the appointment of Don E. Casterline as manager at the Dallas, Tex., division, of which New Mexico is a part. With General Tire since 1952, Casterline has been a division manager since 1955. He replaces Charles L. Howes who also was transferred to the manufactures sales division.

Horchitz retirement ends long BFG career

L. L. Horchitz, former Los Angeles district manager of B. F. Goodrich Industrial Products Co., has retired from the rubber firm, ending a 42-year career. Horchitz is considered one of the best informed men on the use of rubber in industry. He held the post of district manager for 27 years.

Case flies dealers to world premiere

To transport its 5,000 dealers from all over the globe to a world premiere of the firm's construction equipment lines at Nassau, Bahamas, J. I. Case Co. is making use of four major airlines. The planes are moving a thousand persons in and out of Nassau every five days from 42 departure points from coast to coast. The longest flight is 2,942 miles from Portland, Ore. Planning for the entire project was under the direction of Cole H. Morrow, special projects administrator for Case.

D. L. Douglas heads new marketing division at Thew

The Thew Shovel Co. announces the formation of a Marketing Division for its Lorain power shovel and crane line and Moto-Loader front-end loader. This move is made to better implement the direction and control of all phases of marketing for the firm. D. L. Douglass will administer the new division under the title of Director of Marketing. M. B. Garber, with Thew for 31 years, is resigning as director of sales and this title is beng discontinued. Garber remains as vice president and director, functioning as a marketing consultant.

J. L. Beltz, who has been in sales promotion and advertising at Thew for many years, moves from the position of director of sales promotion to that of manager, marketing staff. Appointed to the following new positions under J. F. Beles, manager of parts and service, are C. S. Weber, advertising and sales promotion manager; Q. J. Winsor, product development manager; and Lou Radakovich, training manager.

Cummins moves Studenic to Southwest

Cummins Engine Co., Inc. announces the appointment of J. J. Studenic to manage the Southwest Region, with headquarters in Los Angeles. He comes from the East where he served as a regional representative.

L. B. Foster adds sales representative

Stuart L. Gordon has joined the Los Angeles office of L. B. Foster Co., and will specialize in pipe sales. He has been a sales engineer with West Coast engineering and equipment firms for the past eight years.

Fred Hoffler made sales manager

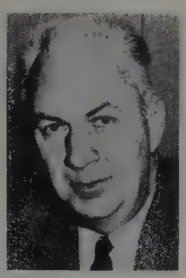
Fred Hoffler has been appointed sales manager of E. H. Edwards

Co., wire and wire rope manufacturing firm with headquarters in South San Francisco, Calif. For the past five years he had been in charge of sales for all products of the company other than wire rope.

Clark appoints two to key sales positions

Keeping pace with its growth in sales and distributor network, the Construction Machinery Division of Clark Equipment Co. has created the positions of sales manager and assistant sales manager. Alvin E.

York



Richards

York, formerly manager of parts and service, has been appointed sales manager. Prior to joining Clark in 1956, he was with Link-Belt Speeder Corp. Wendell V. Richards, formerly product specialist manager, is now assistant sales manager. He has twenty years experience in sales and market research in heavy construction and earthmoving obtained at Clark, R. G. LeTourneau, Inc., and LeTourneau-Westinghouse.

New division formed in California

Fabricated Steel Service, Inc., North Hollywood, Calif., announces the formation of a Tubular Division to produce square and rectangular structural steel tubing. The company will specialize in sizes not usually stocked by Western distributors or produced by steel tube mills. The product will be sold through Western steel service centers and to mill buyers, announces Edwin M. Waite, vice president and general manager. Herbert Ziegler, head of Ziegler Steel Co., is also president of Fabricated Steel Products Co.

New Western district manager

Little Giant Crane & Shovel, Inc., Des Moines, Ia., has appointed a new district manager for the entire Western territory. He is Lou Smith of Torrance, Calif., who has been associated with the company over a period of years. Little Giant is planning an extensive program of demonstration and sales trips featuring the new models, and Smith will direct the new program as well as all sales in the territory.

Field service manager appointed

Thompson Aircraft Tire Corp., South San Francisco, Calif., announces the appointment of Robert A. Singler as field service manager of the Construction Tire Division. Singler formerly was service manager for Wooldridge Manufacturing Co.

New Arizona-operated division formed

In Phoenix, Donald S. MacBride, president of American Cement Corp., announces formation of an Arizona-operated division of the firm which will be known as the

(Continued on page 140)

UNIT PRICES

Selected abstracts for Western projects

BRIDGE—Reinforced concrete bridge and approaches

California—Los Angeles County—State. W. F. Maxwell Co. submitted a low bid of $297,287 for a ½-mi. long concrete bridge with approaches graded and surfaced with plant-mixed surfacing on untreated base.

(1)	W. F. Maxwell Co.	$ 297,287
(2)	O. B. Pierson Inc. & Albert Oberg	306,895
	J. E. Haddock, Ltd.	343,135
	Guy F. Atkinson Co.	347,250

		(1)	(2)
46 ea.	Furn. tbr. brrcds. (bridge)	$ 30.00	$ 20.50
8 ea.	Furn. tbr. brrcds. (hgwy.)	60.00	52.00
	Removing existing bridge	5,000.00	20,000.00
10,000 lin. ft.	Removing traffic stripe	.10	.15
	Clearing and grubbing	5,000.00	12,500.00
	Dev. wat. sup. and furn. wat. equip.	1,000.00	12,500.00
1,100 M gal.	Applying water	2.00	3.00
2,850 sq. yd.	Compacting original ground	.15	.06
2,800 cu. yd.	Roadway excavation	1.00	.80
130 cu. yd.	Structure excavation	2.00	2.00
80 cu. yd.	Structure backfill	3.00	4.00
10,700 cu. yd.	Imported borrow	1.40	1.65
3,900 cu. yd.	Imported subbase material	1.80	1.75
3 ton	Straw	100.00	125.00
6,400 ton	Untreated base	2.80	2.50
9 ton	Asphaltic emulsion (pnt. bdr. and sl. cts.)	46.00	60.00
17 ton	Lqd. asphalt, SC-2 (prm. ct.)	40.00	33.00
200 ton	Lqd. asphalt, SC-4 (P.M.S.)	4.90	5.50
3,800 ton	Mineral aggregate (P.M.S.)	4.90	5.50
140 sq. yd.	Placing P.M.S. ditch and spillway downdrains	1.33	1.00
2,600 lin. ft.	Placing P.M.S. dikes	.12	.55
50 ton	Screenings (med. seat coat)	6.75	6.00
30 cu. yd.	Class C conc. (ret. wall)	45.00	35.00
	Class A concrete (bridge), (1,370 cu. yd.)	75,000.00	75,280.00
	Bar reinforcing steel (brdg.) (350,000 lbs.)	45,000.00	37,195.00
5,920 lin. ft.	Furn. concrete piling	5.00	3.85
130 ea.	Driving piles	300.00	178.50
20,000 lbs.	Misc. iron and steel	.30	.30
820 lin. ft.	Metal safety railing	4.00	3.85
4 ea.	Survey monuments	20.00	10.00
350 lin. ft.	Metal plate guard railing	4.00	3.30
120 lin. ft.	Remov. and recon. guard rail	2.00	1.50
830 lin. ft.	Pipe bridge railing	6.00	6.00
20 ea.	Guide posts	7.00	7.00
	Finishing roadway	300.00	600.00
520 lin. ft.	10" steel and mech. joint pipe (sanitary sewer pipe)	11.50	15.00
1 ea.	Remdl. sanitary swr. manhole	200.00	400.00
	Electrical systems	3,200.00	2,945.00

HIGHWAY—Grading and draining 4-lane highway

Wyoming—Uinta County—State. Taggart Construction Co. submitted the low bid of $859,900 for grading and draining, one structural plate pipe culvert and misc. work on 3.866 mi. of four-lane divided Interstate Highway on the Evanston-Ft. Bridger Road.

(1)	Taggart Construction Co.	$ 859,900
(2)	Morrison-Knudsen Co., Inc.	986,564
	Tiago Construction Co.	1,071,405
	W. W. Clyde & Co.	1,099,743

		(1)	(2)
1,758,500 cu. yd.	Excavation	$ .29	$ .33
920 hr.	Mechanical tamping	5.00	7.50
44,000 M gal.	Watering	1.56	2.25
880 cu. yd.	Excavation for pipe culverts	2.00	2.50
275 cu. yd.	Subexcavation	2.00	4.00
275 cu. yd.	Special rock fill	5.00	10.00
826,500 cu. yd.mi.	Cubic yard mile haul	.12	.12
1,700 hr.	Sheeps foot roller operation	11.00	12.50
3,000 hr.	Pneum. tired roll op. type VII	12.00	12.50
42,100 cu. yd.	Stripping and storing topsoil	.20	.25
40,100 cu. yd.	Replacing topsoil	.30	.30
5,458 lin. ft.	24-in. C.M.P.	6.00	6.50
476 lin. ft.	24-in. C.M.P., 12 gauge	7.00	8.00
346 lin. ft.	36-in. C.M.P.	10.00	12.00
310 lin. ft.	48-in. C.M.P.	14.00	17.00
310 lin. ft.	72-in. C.M.P.	27.00	35.00
83 ea.	24-in. C.M.P. FE section	33.00	46.00
4 ea.	36-in. C.M.P. FE section	90.00	114.00
2 ea.	48-in. C.M.P. FE section	180.00	230.00
184 lin. ft.	108-in. struct. plate pipe 510 lb.	64.00	77.00
300 cu. yd.	Class. 1 riprap	12.00	15.00
300 cu. yd.	Grouted riprap	18.00	25.00
20 lin. ft.	24-in perforated C.M.P., 12 ga.	15.00	11.00
43,800 lin. ft.	32-in. woven and 3 BW fence	.35	.30
60 ea.	End panels	10.00	18.00
90 ea.	Brace panels	8.00	17.40
2 ea.	16-ft. galvanized steel gates	150.00	93.00
4 ea.	7 ft. 9 in.x24 ft. HD cattleguard	700.00	1,200.00
40 ea.	Right of way markers	8.00	11.00
1 ea.	Rein. conc. project markers	25.00	25.00
10 ea.	Type D drop inlets	60.00	82.00
16 ea.	Trash guards type B	75.00	68.00

PIPELINE—Earthwork and structures for laterals

Montana—Missouri River Basin Project—Bureau of Reclamation. A joint venture of Contractors & Excavators and Zuber Bros. submitted a low bid of $185,910 to complete the earthwork and structures of the Spokane Bench laterals, Helena Valley Unit, Helena-Great Falls Division Missour River Basin Project.

(1)	Contractors & Excavators & Zuber Bros.	$185,910
(2)	Holm Southerland Co.	188,486
	Otis Williams	198,181

		(1)	(2)
72,000 cu. yd.	Examination for laterals	$ .39	$ .3
10,300 cu. yd.	Excavation for structures	1.00	.6
400 mi. cu. yd.	Overhaul	.50	.5
7,500 cu. yd.	Compacting embankments	.50	.3
7,900 cu. yd.	Backfill about structures	.50	.5
6,800 cu. yd.	Compacting backfill about structures	3.00	3.5
355 cu. yd.	Coarse gravel protection	4.00	4.5
65 cu. yd.	Riprap	5.00	5.0
25 cu. yd.	Sand and gravel bedding for riprap	5.00	3.0
95 cu. yd.	Pit-run gravel blanket	5.00	6.0
585 cu. yd.	Concrete in structures	98.00	100.0
880 barrels	Furnishing and handling cement	7.00	7.0
44,000 pounds	Furn. and placing reinf. bars	.18	.2
40 sq. ft.	Furn. & plac. ½-in. elastic filler mat. in joints	3.00	1.0
50 lin. ft.	Furn. & plac. 6-in. type B rbr wtrstop	3.00	3.0
0.3 Mbm.	Furn. & erecting walk plank	300.00	400.0
200 lin. ft.	8-in. diam. No. 16-ga. cor.-metal pipe	3.00	3.0
200 lin. ft.	10-in. diam. No. 16-ga. cor.-metal pipe	3.30	4.0
200 lin. ft.	12-in. diam. No. 16-ga. cor.-metal pipe	3.50	4.5
200 lin. ft.	15-in. diam. No. 16-ga. cor.-metal pipe	4.20	5.0
12 lin. ft.	24-in. diam. No. 14-ga. cor.-metal pipe	10.00	7.0
2,330 lin. ft.	18-in. di. std.-strength conc. culv. pipe	5.00	6.0
720 lin. ft.	21-in. di. std.-strength conc. culv. pipe	7.00	7.0
555 lin. ft.	24-in. di. std.-strength conc. culv. pipe	9.00	10.0
100 lin. ft.	30-in. di. std.-strength conc. culv. pipe	12.00	11.0
50 lin. ft.	36-in. di. std.-strength conc. culv. pipe	15.00	13.0
95 lin. ft.	18-in. diam. HC50 conc. press. pipe	10.00	10.0
27 gates	18-in. diam. cast-iron slide gates	100.00	110.0
1 gate	24-in. diam. cast-iron slide gate	145.00	150.0
2 weirs	Furn. & instal. 2-ft. adjustable weirs	90.00	100.0
4,200 pounds	Furn. & instal. misc. metalwork	.60	.6
34 gates	Furn. & erect. barbed-wire fence gates	40.00	40.0
47 crossings	Furn & erect. fence crossings	125.00	200.0
13 cattle grds.	Furn. & constructing cattle guards	300.00	350.0
31 installat'ns	Instal. anchor bolts & brackets for open flow-meters	30.00	15.0

BRIDGE—Precast, prestressed bridge at Fort Bragg

California—Mendocino County—State. Bos Construction Co. of Berkeley submitted the low bid of $295,664 for the construction of a prestressed bridge and approaches totalling about .6 mi. in length across Pudding Creek at Fort Bragg.

(1)	Bos Construction Co.	$295,664
(2)	Thomas Construction Co.	305,642
	Ben C. Gerwick, Inc.	315,234
	Forde-Peletz	339,291

		(1)	(2)
	Removing bridge	$ 2,000.00	$ 5,000.0
4,000 sq. yd.	Obliterating roadway	.10	.1
8 acres	Clearing and grubbing	200.00	850.0
	Dev. water supply and furn. water equipment	6,000.00	8,000.0
560 mi. gal.	Applying water	3.00	3.0
39,000 cu. yd.	Roadway excavation	1.00	.6
325 cu. yd.	Structure excavation	4.00	4.0
210 cu. yd.	Structure backfill	3.00	4.0
200 cu. yd.	Ditch and channel excavation	1.00	2.0
1,180 ton	Imported borrow	2.00	3.0
7,700 cu. yd.	Trench excavation	1.00	.7
6,200 ton	Untreated base	3.00	2.9
6 ton	Asphaltic emulsion (pt. bdr. and sl. ct.)	100.00	90.0
21 ton	Liquid asphalt, SC-2 pr. ct. & pen. treat.)	50.00	60.0
113 ton	Paving asphalt (P.M.S.)	12.00	11.0
2,220 ton	Mineral aggregate (P.M.S.)	12.00	11.0
600 lin. ft.	Placing P.M.S. dikes	.40	.4
23 ton	Sand cover (pr. ct. and penetration treat.)	10.00	10.0
6 cu. yd.	Class A concrete (structures)	100.00	150.0
	Class A concrete (bridge) (235 cu. yd.)	20,500.00	27,000.0
80 ea.	Furn. precast prestressed reinf. conc. deck units	1,000.00	870.0
80 ea.	Erect. precast prestressed reinf. conc. deck units	100.00	140.0
673 lin. ft.	Concrete railing	7.00	7.0
320 lbs.	Bar reinforcing steel	.20	.2
	Bar reinf. steel (bridge) (23,500 lbs.)	4,000.00	5,000.0
1,735 lin. ft.	Furn. concrete piling	11.00	10.5
420 lin. ft.	Furn. steel piling	6.00	6.0
28 ea.	Driving concrete piles	1,000.00	1,660.0
5 ea.	Driving steel piles	300.00	275.0
21 ea.	Right of way monuments	6.00	10.0
128 lin. ft.	Metal plate guard railing	4.00	6.0

54 ea.	Guide posts, markers & horiz. reflector units	6.00	7.00
10 ea.	Removing & resetting guide posts	4.00	3.00
900 lin. ft.	New property fence	1.00	1.00
58 lin. ft.	8 in. C.M.P. (16 gage)	3.00	3.00
90 lin. ft.	12 in. asbestos bonded C.M.P. (16 gage)	5.00	6.00
194 lin. ft.	18 in. asbestos bonded C.M.P. (16 gage)	6.00	7.00
140 lin. ft.	24 in. asbestos bonded C.M.P. (14 gage)	9.00	10.00
524 lin. ft.	8 in. P.M.P. underdrains	2.00	3.00
90 cu. yd.	Type B filter material	6.00	8.00
8,400 ton	Type C filter material	1.00	.95
	Finishing roadway	100.00	300.00
2 ea.	Redwood covers for drop inlets	10.00	50.00

IIGHWAY—7.593-mi. forest road in Utah

Utah — Summit and Duchesne Counties — Bureau of Public Roads. V. W. Clyde & Co. of Springville submitted a low bid of $605,174 for onstruction of a 24-ft. wide, 7.593 mi. long road in Wasatch National orest.

) W. W. Clyde	$605,174
) Nelson Bros. Construction Co.	697,412
Morrison-Knudsen Co. Inc.	706,762
Strong Company	759,370

		(1)	(2)
ontingent sum	Extra and miscellaneos work	$2,000.00	$2,000.00
30 acres	Grubbing	400.00	200.00
4,000 cu. yd.	UNCLASSIFIED EXCAVATION	1.23	1.65
5,250 cu. yd.	Borrow excavation, case 1	.75	.50
4,000 lin. ft.	Furrow ditches	.30	.25
2,250 cu. yd.	Excavation for structures	5.00	5.00
0,000 ton	Special subbase, grading B	1.60	1.50
0,000 sta. yd.	Overhaul	.03	.02
0,000 yd. mi.	Overhaul of borrow, case 1	.20	.25
3,400 units	Water	1.00	1.50
Lump sum	Providing & maint. water plant or plants	3,400.00	4,700.00
1,200 hours	Rolling	8.00	8.50
Force account	Obliteration of old roadways (F.A.)	3,500.00	3,500.00
10 acres	Roadside cleanup	500.00	400.00
7,000 ton	Cr. aggregate base, grading E	2.00	1.70
5,000 sq. yd.	Processing bituminous base	.10	.10
725 ton	Asphalt, grade MC-0, 1, 2, or 3	40.00	45.00
60 ton	Emulsified asphalt, gr. SS-1, fog seal	45.00	45.00
5 ton	Bituminous additive (conc. grade)	1,000.00	900.00
127 cu. yd.	Class A concrete	125.00	120.00
60 lin. ft.	18" galv. corrugated metal pipe	5.00	6.00
3,900 lin. ft.	24" galv. corrugated metal pipe	8.00	7.00
102 lin. ft.	30" galv. corrugated metal pipe	10.00	8.50
60 lin. ft.	36" galv. corrugated metal pipe	15.00	15.00
214 lin. ft.	60" galv. corrugated metal pipe	33.00	30.00
,000 lin. ft.	8" perf. corrug. metal pipe underdrain	2.60	3.50
450 cu. yd.	Porous backfill mat., pipe underdrain	8.00	6.50
390 each	Guideposts	9.00	10.00

IGHWAY—4.1 mi. of grading, draining, and paving

Arizona—Gila County—State. Isbell Construction Co. of Phoenix mitted a low bid of $1,348,215 for 4.1 mi. of grading, draining. cing base, bituminous paving and applying seal coat.

Isbell Construction Co.	$1,348,215
Copper State Construction Co.	1,371,895
Wallace & Wallace	1,555,444
Peter Kiewit Sons' Co.	1,769,720

		(1)	(2)
,000 cu. yd.	Roadway excavation	1.96	1.88
,000 cu. yd.	Overbreakage	1.47	1.41
,000 cu. yd.	Slides	.94	.94
,860 cu. yd.	Drainage excavation	1.00	2.00
500 lin. ft.	Grader ditches	.15	.15
,700 lin. ft.	Crown ditches	.40	.44
,270 cu. yd.	Structural excavation	4.50	5.00
,600 cu. yd.mi.	Overhaul	.25	.36
,000 ton	Borrow (C.I.P.)	.48	.60
1 lump	Provide water supply	10,000.00	10,000.00
150 M gal.	Apply water	2.55	3.50
600 hr.	Rolling (class I)	8.00	10.00
200 hr.	Rolling (class II)	10.00	14.00
900 ton	Select material (C.I.P.)	.98	1.00
700 ton	Aggregate base (C.I.P.)	1.65	1.80
100 ton	Cover mat. for seal coat	5.00	8.00
200 ton	Bit. mix (cl. II-plant mix)	3.30	3.50
210 ton	Liq. asphalt for prime coat	52.00	49.00
42 ton	Liq. asphalt for tack coat	90.00	90.00
615 ton	Pav. asphalt for bit. plant mix	46.00	43.00
150 ton	Emul. asphalt for seal coat	54.00	52.00
391 cu. yd.	Class A concrete (C.I.P.)	75.00	100.00
100 lb.	Reinf. steel (bars) (C.I.P.)	.15	.18
122 lin. ft.	24" C.M.P. (C.I.P. except excavation)	6.50	6.80
16 lin. ft.	30" C.M.P. (C.I.P. except excavation)	7.75	8.00
158 lin. ft.	36" C.M.P. (C.I.P. except excavation)	11.75	12.50
1 lump	Misc. removal and other work	5,000.00	4,350.00
370 lin. ft.	Road guard	3.60	3.30
400 lin. ft.	Reconstruct road guard	2.25	2.00
62 ea.	Guide posts	6.00	8.00
70 ea.	R/W markers	12.00	12.00
000 lin. ft.	Placing bit. mixed curbs	.15	.15
150 lin. ft.	Placing bit. mixed gutters	1.25	1.50
048 lin. ft.	24" culvert pipe	6.50	6.80
273 lin. ft.	30" culvert pipe	7.75	8.00
830 lin. ft.	36" culvert pipe	11.00	12.50

HIGHWAY—5.7 mi. of grading and paving

Washington—Pacific County—State. Osberg Construction Co. of Seattle submitted the low bid of $1,069,758 for 5.722 mi. of grading and paving from the Cedar River to the North River in Pacific County.

(1) Osberg Construction Co.	$1,069,758
(2) Strong & MacDonald, Inc.	1,308,422
Bocek Brothers	1,379,807

		(1)	(2)
65 acre	Clearing	$1,000.00	$1,800.00
40 acre	Grubbing	600.00	1,000.00
322,630 cu. yd.	Common excavation	.65	.70
220,000 cu. yd.	Common borrow	.60	.65
117,640 unit	Overhaul	.50	.50
4,960 cu. yd.	Comon ditch excavation inc. haul	1.00	1.50
1,810 cu. yd.	Common channel excv. inc. haul	1.50	1.50
30,400 cu. yd.	Unsuitable found. excv. inc. haul	1.00	.85
6,210 cu. yd.	Structure excavation	3.00	3.50
1,550 M gal.	Water	.50	2.50
429,910 cu. yd.	Embankment compaction	.05	.05
430 hr.	Gang plow and tractor	12.50	18.00
430 hr.	Tandem disk and tractor	12.50	15.00
13,140 lin. ft.	Slope treatment class B	.15	.20
360 hr.	Pneumatic tired roller	8.00	10.00
360 hr.	Smooth wheeled power roller	8.00	8.00
895 hr.	Mechanical tamper	8.00	8.00
283 sta.	Finishing roadway	20.00	20.00
350 cu. yd.	Special backfill for foundations	10.00	9.00
	Gravel backfill for drains	10.00	11.00
44,760 ton	Special ballast	1.90	1.40
350 ton	Asphaltic conc. pavement class B	15.00	17.00
27 cu. yd.	Concrete class C	80.00	125.00
206 lin. ft.	Type 1 perforated metal drain pipe 6" diam.	2.00	3.00
116 lin. ft.	Type 1 perforated metal drain pipe 18" diam.	5.50	6.00
3,150 lin. ft.	Conc. or V.C. drn. pipe 8" diam.	1.00	2.00
964 lin. ft.	Conc. or V.C. drn. pipe 10" dia.	1.50	2.50
2,631 lin. ft.	Std. reinf. conc. culv. pipe 18" dia.	6.00	6.50
378 lin. ft.	Std. reinf. conc. culv. pipe 24" dia.	8.00	10.00
177 lin. ft.	Std. reinf. conc. culv. pipe 30" dia.	12.00	16.00
60 lin. ft.	Std. reinf. conc. culv. pipe 36" dia.	16.00	19.00
116 lin. ft.	Std. reinf. conc. culv. pipe 48" dia.	20.00	23.00
214 lin. ft.	Plain metal culvert pipe 14 ga. 24" dia.	8.00	7.00
554 lin. ft.	Type 3 metal culvert pipe 16 ga. 18" dia.	6.00	6.50
87 lin. ft.	Type 3 metal culvert pipe 14 ga. 24" dia.	10.00	9.00
96 lin. ft.	Type 3 metal culvert pipe 10 ga. 60" dia.	40.00	50.00
220 lin. ft.	Type 3 metal culvert pipe 8 ga. 84" dia.	75.00	75.00
1,800 lin. ft.	Culvert logs	2.00	2.50
200 ea.	Right of way markers	6.00	10.00
62,340 ton	Special loose riprap	4.50	6.75
240 cu. yd.	Hand placed riprap	20.00	20.00
5,725 lin. ft.	Wire fence type No. 2	.20	.65
300 cu. yd.	Salvaging existing boulders	2.00	5.00

HIGHWAY—9.7-mi. long project in Montana

Montana—Park County—State. Eleven bidders were separated by only $73,000 in competition for a 9.3 mi. grade, aggregate, surfacing, and drainage project. Low bid was submitted by Long Construction Co. of Billings, at $507,106.

(1) Long Construction Co.	$507,106
(2) Holland Construction Co.	515,258
Taggart Construction Co.	528,333
Naranche & Konda	530,466

		(1)	(2)
L S	Clearing and grubbing	$7,000.00	$8,000.00
628 060 cu. yd.	Unclassified excavation	.32	.27
1,439 cu. yd.	Culvert excavation	2.00	3.00
332,138 mi yd.	Overhaul of unclas. excavation	.17	.20
1,170 unit	Rolling embankment	6.00	8.00
590 unit	Rolling surface courses	8.00	8.00
3,776 mi. gal.	Watering embankment	.50	1.00
2,951 mi. gal.	Watering surfacing courses	1.00	1.50
26,830 ton	Select bor. base crse.—4 unc.	.70	.60
64,424 ton	Select bor. base crse—3 cru.	.80	.70
56,270 ton	Select bor. base crse.—1½ cru.	.90	.80
L S	Remove existing structures	500.00	500.00
74 cu. yd.	Hand laid riprap	8.00	20.00
3,075 cu. yd.	Type B random riprap	4.00	5.00
21 lin. ft.	Relay pipe culverts	3.00	3.00
544 cu. yd.	Gravel backfill	3.00	4.00
98 lin. ft.	18 in. cor. met. pipe—syph. 16G	7.00	8.00
153 lin. ft.	24 in. cor. met pipe—syph. 14G	10.00	14.00
34 lin. ft.	36x22 cor. met. pipe arch—10G	12.00	12.00
300 lin. ft.	12-10 x 8-4 str. plate arch—7G	95.00	140.00
88 lin. ft.	16-7 x 10-1 str. plate arch—3G	145.00	200.00
72 lin. ft.	Struc. plate stkpass—DES B	75.00	80.00
246 lin. ft.	18 in. rein. conc. pipe culv.	6.00	6.00
1,792 lin. ft.	24 in. rein. conc. pipe culv.	10.00	12.00
204 lin. ft.	36 in. rein. conc. pipe culv.	18.00	20.00
64 lin. ft.	44 x 27 rein. conc. arch culv.	22.00	25.00
114 ton	Bentonite canal liner	70.00	130.00
1 each	Project marker	25.00	25.00
51 each	Station marker	10.00	10.00
56 each	Right of way monument	6.00	10.00
L S	Rem. & reset misc items	2,000.00	500.00

CLASSIFIED

Rates are $15.50 a column inch. Copy should be sent in by the 15th of month preceding publication date.

FOR SALE

Space is sold as advertisers inches. All advertisements in this section are ⅛ in. short of contracted space to allow for borders and composition.

Manufacturers

(Continued from page 137)

Phoenix Cement Co. It will produce and market cement for its new $16,000,000 plant now under construction in Clarkdale. Officers of the new company are Ray R. Adams, president; Frank N. Steadman, vice president; and W. A. Warriner, assistant to the vice president.

John Sommerville joins Gar Wood

D. J. Davis, general sales manager, Construction Equipment, Gar Wood Industries, Inc., announces appointment of John Sommerville as district sales representative for the Gar Wood-Buckeye line of ditchers, spreaders, finegraders, and Gar Wood crawler excavators and truck cranes. He joins Al Guthrie, West Coast district manager at Richmond, Calif. Under Guthrie, he will be in direct contact with dealers, their salesmen, and Gar Wood-Buckeye customers throughout the West Coast area, which includes California, Nevada, Oregon, Washington, Idaho, Utah, and Arizona, as well as British Columbia, Canada. Sommerville brings to his new position a background of ten years' experience in construction equipment.

Change in name

John J. Ulrich Co., El Paso, Ill., has been incorporated under the new name of Ulmac Equipment Co., Inc. The name was formed from the names of the company's co-founders, John J. Ulrich and R. D. MacDonald. Ulmac products will continue to be sold and serviced exclusively by Caterpillar dealers.

Clark Equipment names two to field

Robert J. Warren has been appointed field engineer for the Construction Machinery Division of Clark Equipment Co., Benton Harbor, Mich. He will render sales assistance service in the application of Michigan construction machinery. Before joining Clark, Warren had been a field engineer for two years with LeTourneau-Westinghouse Co. Also announced is the appointment of William A. Keehn as special representative. He will work with distributors throughout the country.

Two promoted in sales

Ideal Cement Co., Denver, Colo., announces two promotions. Earle Beattie is promoted to assistant sales manager, dealer sales, and James G. Moerder, assistant sales manager, contract sales. Both men will headquarter at the California Division headquarters in San Francisco, where W. J. Conway is manager.

Personnel changes at Gardner-Denver

Norm Nevin replaces Bill D. Elliot as district manager of the Seattle, Wash. district of Gardner-Denver Co. Nevin was formerly district manager at El Paso, Tex. Elliot is moving to G-D's petroleum division in Dallas, Tex.

CIT makes area staff changes

F. L. Conrad, division manager of C.I.T. Corporation, Seattle, announces that E. J. Richards will be their area representative in eastern Washington and northern Idaho, with headquarters at Spokane, Wash. F. J. Paulson, who has handled this area for the past five years is transferring to Seattle to represent the western Washington area along with A. D. Keith. A. W. Green will continue to handle the Montana area, with headquarters in Billings.

Euclid reassigns Wynkoop; establishes parts depot

G. A. "Gerry" Wynkoop has been assigned to the California and Nevada territory of Euclid's Western region. For the past year he has been district representative for Euclid in Montana.

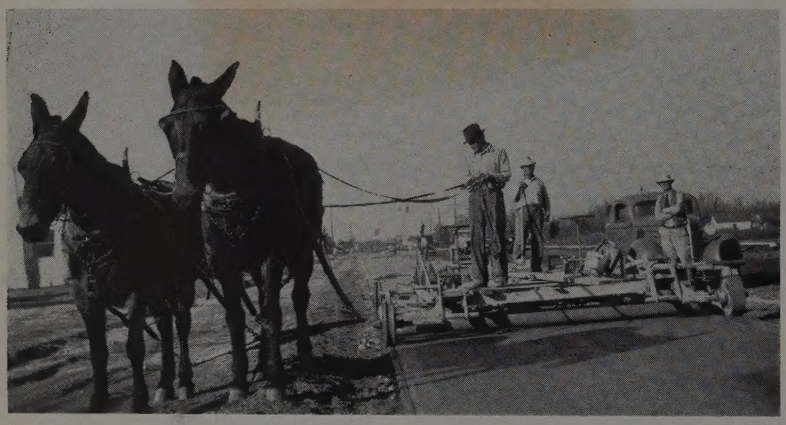
Pending appointment of a new dealer for the Southern California territory, Euclid has established a parts and service depot for that area located at 125 N. Vineland Ave. in La Puente. Under the supervision of D. R. Anderson, an experienced staff is on hand to service Euclid owners. There is no change in the location of the Western regional office, managed by M. H. Johnson in Oakland.

White Motor branch construction progress

Construction is in progress on White Motor Co.'s new factory branch in Denver which will serve the entire Rocky Mountain area. According to Wilson D. Patterson, White's regional vice president, the new building will be the most modern truck service station in the country.

ADVERTISERS in this issue

BACKFILL, uncompacted



Power plant of new design

The internal combustion engine as a source of power on construction equipment may be on its way out, according to Harrison Fleetwood Tawney, President of the Harrison Fleetwood Tawney Co. The Tawney firm is well known for pioneering such construction developments as the jet-assisted screwdriver and the noiseless field water-closet.

Now under extensive testing at the firm's closely guarded proving grounds is a prime mover of revolutionary new design. Called a "Mule", it operates on an amazing new principle totally unlike conventional engines.

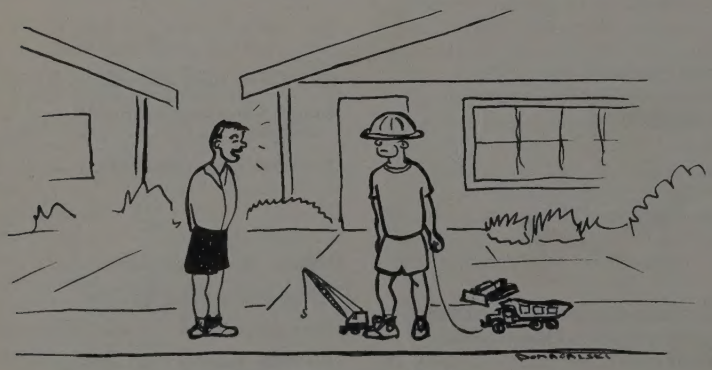
"What we were striving for during the design stage," said Tawney, "was to give contractors a machine with a low gasoline consumption, ease of maintenance, and without a complex hydraulic system. We succeeded beautifully. Gasoline and diesel fuel costs have been drastically reduced. The hydraulic system uses plain water, which is poured in a hole at one end. But you've got to pour it. It's not enough just to lead the machine to the water."

In the photograph the new rigs are on the left. They can also be connected in tandem. In the background behind the finisher is Mr. Tawney, putting his initials in the pavement with a sharp stick.

"We can reveal these details at this time," declared Tawney, "because we believe in making whatever contribution we can to the progress of the construction industry. Besides, we'll have the market flooded before our competitors can change over their production. And when the imitators start to appear, we'll sue everybody in sight.

"There's only one disadvantage. The sight of this revolutionary piece of equipment frightens car drivers half to death. But they'll get used to it."

Down-time . . . . . By Domagalski



"What does your Dad do?"

WESTERN CONSTRUCTION

Needs a translator

DEAR EDITOR: Can we have a copy of the "Handy Translator Part I" in your April 1958 issue for translating Engineers' English? Part II in the Sept. 1958 issue translating Contractors' English has been a great help in training the new members of our organization, but because we have not seen Part I, we are unable to interpret the correct meaning of the Engineers' directives, and thereby our superintendents are not enjoying the extra hours of relaxation in their pickups as mentioned.

Charles MacClosky Co.
Contractors-Engineers
Gardena, California

Letters like yours are much appreciated, as they indicate our labors are not unnoticed. As you realize, compilation of data for a "Translator" requires many long hours spent poring over musty engineers and contractors.

Editor

Vox pop

For the tenth time in ten days the City Engineer's office received a phone call from the same irate citizen. "When are you going to fix the leaky main in front of my house?" he demanded. "My front yard is half covered with water now, and I'm getting plenty sick of it."

"The Board of Supervisors met this morning," said the engineer calmly, "and your case came up for consideration. It was decided that the City will buy you a duck."

. . . The Editors