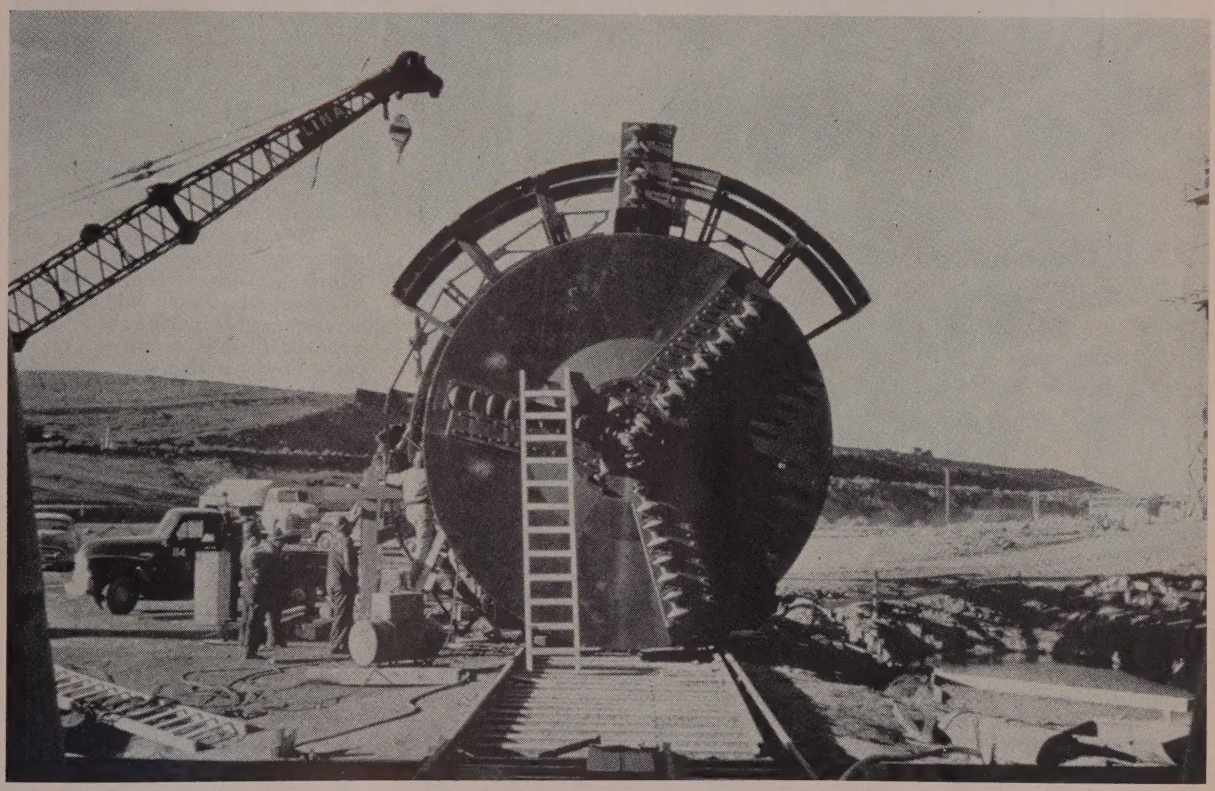
WESTERN CONSTRUCTION

FEBRUARY 1955



Final assembly at portal means Mittry's mole is nearly ready for—

Soft-rock tunneling at 5 ft. per hr.

THE BIGGEST THING in tunneling today is Mittry's mole—the continuous boring machine built for Mittry Constructors to drive outlet tunnels at Oahe Dam. Put to work late last year, the rig bit right into the Pierre shale at a rate that ran as high as 5 ft. per hr. F. K. Mittry, Sr., had that figure in mind when he reported that the machine "goes like hell." But he knew about a lot of idle time too — time spent working the bugs out of his revolutionary rig.

The machine is an all-purpose jumbo. It has two concentric rotary cutter heads, which substitute for the more conventional array of drill jibs. The outer cutter head also works like a wheel-type trencher. Coupled with a line-up of belt conveyors projecting to the rear, this feature replaces a separate mucking machine. Finally, the mole has a built-in assembly jig for ring steel.

Cause of all the excitement is the cutting equipment, known as a McKinley head. It was adapted from coal mining for use on this job. The principle is simple, but building a 100-ton machine that will perform economically in driving 26-ft. diameter tunnel is another matter.

Actual cutting equipment on both inner and outer heads consists of knives and beveled rollers. There are three radial rows of cutters on the inner head, spaced 120 deg. apart. The outer head mounts six sets, at 60-deg. intervals.

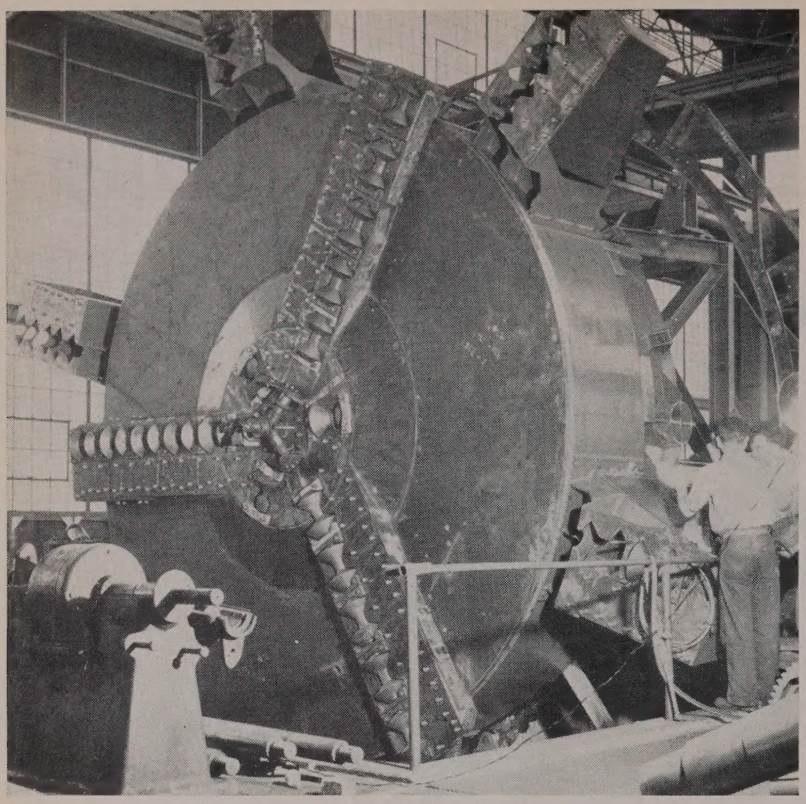
Each knife is 10 in. long, measured along the arc it travels. It is 1 in. thick, and it projects 10 in. from the face of the cutter head. The knives are 10 in. apart on the cutter head radius. Known as fixed cutters, these are a modification of the H & L Tooth Co. No. 21 tooth. Included angle between the tunnel face and the fixed cutter edge itself is 60 deg.

Following the knives in their rotation with the cutter head are sharply beveled rollers, known as disc cutters, which project their maximum amount at points midway between pairs of fixed cutters. The disc cutters are normalized steel castings.

Action of the rotating cutter heads is two-fold. First, the fixed cutters rip kerfs in the shale. Then, wedge action of the disc cutters breaks the rock into the kerfs, from which it falls to the tunnel invert for mucking.

The rotating ring for the outer cutters is the same diameter as the inner cutter head. The six sets of cutters project radially from the machine. This means an annular space remains where muck can fall and from which it is scooped by buckets that are part of the outer cutter assembly.

Final operating feature of the cutter head is a pilot bit and cone at dead



SHOP VIEW of cutter heads shows scale of boring machine. Studs next to disc cutters show position of fixed cutters. Outer cutter buckets handle mucking chore onto conveyor belt.

center, projecting 16 in. from the cutter head face. This bit helps hold the machine on line and grade despite difference in cutting resistance at various points on the tunnel face. The pilot bit and its immediately surrounding cutters represent a radius of about 2 ft. Beyond it, on the face of the inner head, are 10 fixed cutters at the regular 10-in. spacing. Altogether, the combination comes to a radius of 9 ft. 3 in., a diameter of 18½ ft.

Each of the outer cutter assemblies adds a radial increment of 3 ft. 9 in. Thus the effective cutting diameter of the entire machine is 26 ft. It is adjustable, however, to fit different tunnel sections within a small range. To make the changes needed on this job, a 9-in. extension is removed from each bucket of the outer cutter head.

Directly above and behind the cutter heads is a permanently installed circular segment of structural steel that serves as a sliding roof support as the machine moves forward. Behind it, in turn, is a mechanized jig for installation of steel tunnel supports. This jig is in the form of a continuous ring, upon which quadrants of steel are placed and bolted together to make the final assembly.

Now, how does it move?

At Oahe Dam various portions of the outlet tunnels are covered by three separate prime contracts. Mittry's work is designated Stage 1 and involves driving six tunnels from the already completed intake structures to a point roughly below the axis of the dam. The first 120 ft. of each tunnel is bored to a diameter of 26 ft. 3 in. (3 in. outside the ring beams). The rest is bored to a diameter of 24 ft. 9 in. Each tunnel will have a finished diameter of 19 ft. 9 in. They are 85 ft. apart, center to center—and in the soft Pierre shale, the absence of blasting is all to the good. Average tunnel length is 1,560 ft.

With the intake structures already in place, there is restricted clearance for moving the boring machine in. It is necessary to final installation of the outer cutters after passing through the intake structures.

In position to dig, the machine is supported both on a "shoe" and on flanged wheels and rails. The steel shoe is under the front of the machine, taking about one-third of its weight and sliding along the excavated invert surface. (The shoe also contains a 9-in. adjustment in length for changing boring diameter.)

About midway of the jumbo its wheels are supported by independent rails set on brackets resting on the ring beams. Gage of these rails is 13 ft. They are 131-lb. rail mounted on 10-in. 49-lb. wide flange beams. These beams rest on the ring beam brackets. The bottom side of each bracket is curved to fit the ring beam; and the backet is prevented from sliding by a lug welded to the ring beam.

Normally only two 12-ft. rail sections are needed on each side. They are picked up and leap-frogged by means of a traveling chain hoist suspended under the jumbo.

The machine is moved forward by hydraulic rams bearing on the ring beams. In this respect it is reminiscent of the special "breast board" jumbo used by Morrison-Knudsen Co., Inc., for excavation of the Broadway vehicular tunnel in San Francisco. (**Western Construction**—April 1952, p. 70.)

The propelling jacks are mounted about 7 ft. back from the face, on each side and just below spring line. They have a 4-ft. stroke, and are retracted and reset as the machine moves ahead. The rig is retracted by a hydraulic jack pushing against the face. This jack is mounted in the sliding support shoe.

Horizontal control is provided by a jack mounted on each side at spring line and just behind the cutter head. Vertical control is by two more jacks resting on the sliding shoe. The pilot bit and cone helps these jacks in their function.

Cutting power and progress

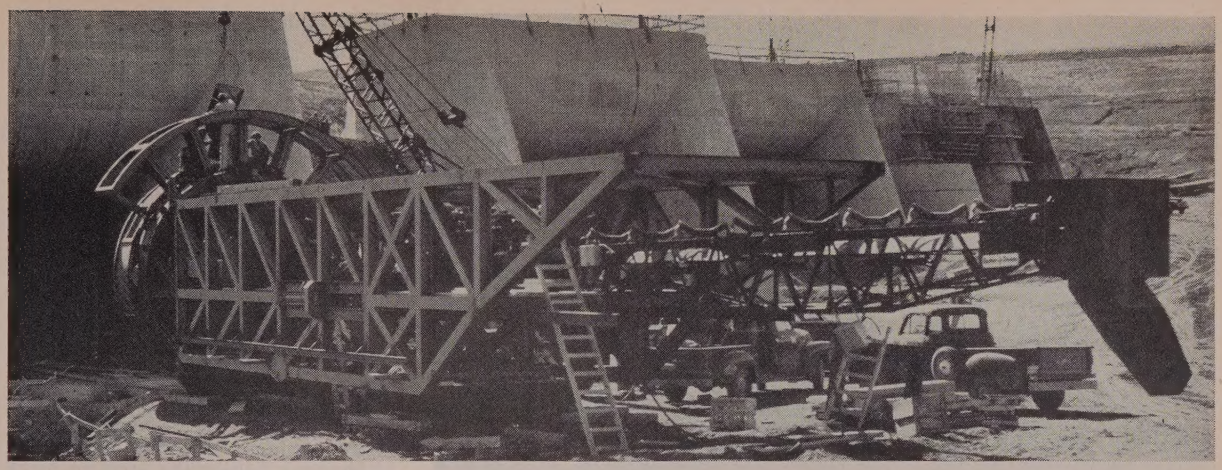
Power for the cutter heads comes from a pair of 200-hp. electric motors. Outer cutter head speed is 6 rpm., and inner cutter head speed is 9 rpm. Viewed head on, the inner head revolves counterclockwise, the outer head clockwise, to minimize torque. Mittry is thinking of reducing these cutter head speeds by about 30%. Tests of different speed combinations and jacking pressures should reveal the optimum rate of cutter wear, one of the best indexes to boring performance.

As matters stand now, the fixed cutters are hardfaced with Tube Borium on the side away from the face, to give a self-sharpening effect. They are replaced when worn down, a job that takes about 2½ hr. Teeth dig about 40 ft. of tunnel before this change is needed. Mittry reports that the Pierre shale is not particularly abrasive, but that thin lenses of hard manganese concretions are encountered that result in considerable wear to the fixed cutters.

Including maintenance time, the average rate of progress has been slightly over 3 ft. per hr. The best speed for continuous boring is about 5 ft. per hr. Work started on November 28, 1954, and had advanced 418 ft. by December 28. Within this period 311 ft. was legged between December 20 and December 28, showing that year's end saw the "bugs out" and the mole settling down to its chore. Work is being done on two 10-hr. shifts.

Handling muck and concrete

The operation of Mittry's boring machine has its peculiar effect on other tunnel work. To start with, muck is removed from the tunnel—all the way — by means of 24-in. belt



FULL LENGTH is about 72 ft.—plus the conveyor truss projecting to the rear. Propelling jack mountings, on side of jumbo frame, have now been moved forward to help horizontal control of jumbo. Flexibility like this may get more work for the mole on Oahe power tunnels.

conveyors. These are suspended from brackets on the ring steel high in the arch. Rubber-tired units transport the muck from portal to disposal area.

The conveyors are supported high enough to be clear of invert concrete work. This comes along as close behind the mining machine as is practicable. The concrete comes into the tunnel by rail, in 2-yd. buckets, and is transferred to a monorail that jumps the bucket forward for discharge into the pugmill of a Rex 200 dual Pumpcrete. An air-operated cherry picker does the bucket handling at both ends.

After concrete has attained sufficient strength, the whole spread is moved forward, and regular 60-lb. railroad rail is laid for later materials handling, for moving tunnel arch forms, and eventually for moving the boring machine back out.

Mucking can continue while invert concreting is under way, but the muck conveyors must be removed for arch concrete placement. Time of placing the lining is governed by reaction of the shale after it is exposed.

Men with ideas

The boring machine at Oahe, which establishes both the manner and the pace of tunnel driving and lining, is strictly a venture of the contractor. Origin of the idea for use on this job was with F. K. Mittry, Sr., president of Mittry Constructors, and F. K. Mittry, Jr., general superintendent for the company on its Oahe Dam contract.

The detailed design of the machine was carried out by James S. Robbins & Associates, consulting engineers of Chicago. Fabrication and assembly was handled chiefly by Continental Foundry & Machine Co., East Chicago, Ind.

Others in the Mittry organization at Oahe include W. L. Sanders, project engineer; George Lyle, tunnel superintendent; and M. L. Mittry, carpenter superintendent. Jake Vogelzang is master mechanic. Wiley Crandall and Clyde Westmoreland are operators for Mittry's mole.

The Oahe project is under the jurisdiction of the Omaha District, Corps of Engineers. John W. Sibert, Jr., is area engineer at Pierre, South Dakota.

Corps of Engineers: "Mittry has reversed a trend"

COMPARISON of Oahe and other soft-rock tunnel jobs shows what a big step Mittry Constructors has made with its new boring machine. Here are extracts from a comparative summary prepared by the Omaha District, Corps of Engineers:

"This is our fourth experience in driving major tunnels through bed rock adjacent to the main stem of the Missouri River. It began with Fort Peck and extends through Fort Randall and Garrison, recently completed. Each of these sets of tunnels was driven through soft rock which might be considered ideal tunneling material. Fort Peck tunnels are in Bearpaw shale; Garrison tunnels are in the Fort Union formation; Fort Randall tunnels are in the Niobrara chalk; and Oahe tunnels are in Pierre shale.

"Contractors, over the years, have been able to standardize the equipment and methods for mining in hard rock. The work along the Missouri River has seen the contractors and the mining equipment industries recognize the specific problems of soft-rock mining and make a determined effort to improve on hard-rock equipment and techniques.

"In the Fort Peck tunnels the rock was blasted and removed by mechanical muckers and trains. Several refinements were necessary to adapt the work to soft rock. The most important was three-stage excavation, to prevent roof falls.

"At Garrison the contractor again used hard-rock tunneling methods but a jumbo permitted him to mine the entire tunnel at one operation. All work at the face could be accomplished under the protection of the jumbo. The jumbo, however, did not materially reduce the number of people at the heading and therefore could not be classified as a mechanical miner.

"The contractor for the Fort Randall tunnels took the first step in mechanization. Specifications for the work permitted blasting but required that the periphery be line-drilled or sawed prior to blasting. Initially, the contractor drilled 4-in. holes 4 in. apart and 8 ft. deep. This work required as many as 12 people working at the face for hours at a time. The method was expensive and dangerous because of the exposure.

"The contractor bought a saw that is used to help in mining coal seams. He built a jumbo with a huge circular gear at the front end to move the saw. The saw cut a groove 8 ft. deep. Thus, the one man necessary to operate the saw replaced the 7 or 8 men who operated the drills.

"The Oahe tunnel contractor has distilled the experience at Fort Peck, Garrison and Fort Randall and boldly projected them forward to depart almost entirely from hard-rock tunneling methods. It appears, in fact, that he has reversed the trend and that equipment and techniques developed in soft-rock tunneling may in the future be applied to hard rock if power requirements can be met to operate the machine and cutting teeth developed to withstand the wear of digging harder rock."

TWO PRECAST sides, resting on grooved concrete foundation pads, and the deck slabs are the basic 6-ft. long parts used to construct any length of culvert. Detail below shows connection.

Precast concrete culverts

Rapid erection, low first cost, minimum of men and equipment are features of the solution found by one county engineer to road crossings over irrigation laterals

By H. R. SWEET
County Road Engineer
Yakima County, Washington

THE PRECAST CONCRETE CULVERT design was prompted by the problem of irrigation laterals crossing our county roads. The limited head room between the top of roadway surface and the bottom of the laterals would not allow the use of reinforced concrete culvert pipe without making a siphon crossing and was impractical at the required locations.

Our first problem involved the cost of any proposed culvert compared to the cost of reinforced concrete pipe. With this thought in mind we worked toward a design which would be simple to manufacture and erect. Since all of our major construction is contracted, we were limited to the equipment used in maintenance and minor construction and to men who had very little experience in this type of work.

Erection starts at center

The precast concrete culvert used was designed by Joseph Andreotti, assistant county road engineer. It was one which I felt would fulfill all the measurements desired. The culvert consists of three units — two walls and a deck. Each unit is 6 ft. long with the total being determined by the length of culvert required. The wall and deck sections were made by Yakima Cement Products Co. They were then stockpiled at the culvert site.

Our bridge crew next removed the existing structure and poured the grooved footings in place. Erection of the precast sections was started at the centerline of culvert by placing a wall section in each footing and fitting the deck section. In this operation, cross bracing was used inside the two wall sections to offer protection for the workmen and stability in erection. The wall and deck sections were tied together by 3½x3½x½-in. by 4-ft. angles bolted to the coil ties which were also used in the handling and placing of the precast sections. The angles also tied the units together which gave the culvert stability at the corners. It had a tendency toward making it a monolithic structure.

To insure no movement of the units while placing the backfill, a crossbrace was placed at the middle of each panel point until each approach had been backfilled and thoroughly compacted.

Asphaltic joint filler

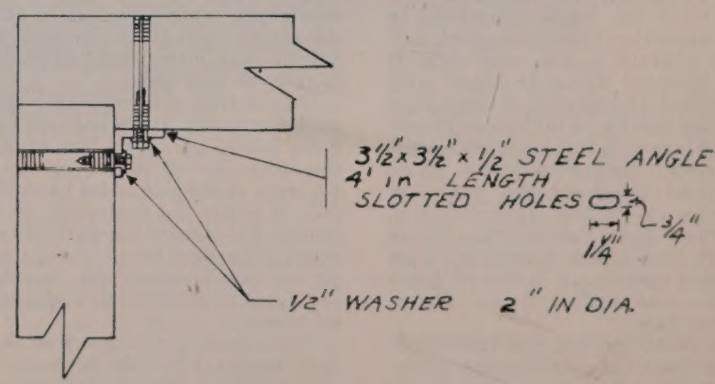
The deck sections were designed for H-20 loadings with a foot of cover, if required. The edges between deck sections were reinforced with additional reinforcing steel to meet requirements for edge beams. Wall sections at each end of the culvert had reinforcing steel extending to tie wing walls to the precast culvert. The wing walls were poured in place.

We did not place an inverted slab in the culvert because the roughness factor of the canal was high. The area of the culvert required by the irrigation company did not demand the use of an invert slab. The joint at the footings was grouted with an asphaltic joint filler which helped fill all the irregularities caused by forming. None of the other joints or abuting sections were grouted.

We have erected two of this type culvert—one 36 ft. long and the other 66 ft. long. The cost for both culverts, which were included in one project, was $46.00 per lin. ft. This price includes all materials, labor, and rental involved. The 66-ft. culvert was relocated and resulted in the excavation of a completely new trench which raised the cost per foot materially.

We have found this type of culvert simple to erect. Erection time for the 66-ft. culvert was about 11 hr. with a corresponding hold-up in traffic of nine days.

ANGLE IRON connection of the deck to the wall units provides semi-rigid frame. Coil ties are used for bolting connection, also in the handling and erection of the units.



...construction plans and —

...d Beardsley units to start this summer.
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being built by the two irrigation districts.

Contract documents next month

The succession of steps toward Tri-Dam Project construction in 1955 is governed by the intention of making construction contract awards about the first of June. It is expected that 30 days will be required after bidding to evaluate construction bids and market bonds. Working back still further, it is planned to allow 45 days between advertising and bidding dates. This would indicate an advertising date of about March 15. Plans and specifications are expected to be ready late this month.

A last critical look at plans for both construction and bond bidding was undertaken in January by a special ...bond-financed project of this type is that neither conventional bidding system—lump-sum or unit-price—is entirely satisfactory for all interested parties. Contractors can show a more attractive total bid on the unit-price basis, since there is no risk involved in the event of quantity over-runs. Bonding houses, on the other hand, must nail down the final cost accurately and in advance. Otherwise, the risk falls on bond holders and forces bond interest rates up. This diverts a greater amount of bond sale proceeds to debt service, and in turn limits the amount of money available for actual construction.

A compromise would seem possible in the form of bidding by unit-price-plus-ceilings. There is precedent for this form of contract. Such a solution was attempted in 1953, after the original bidding on the Tri-Dam Project and when the bond market tightened up. But since the added risk factor necessary under such a setup had not been included in the bids already received, an agreement quite understandably could not be reached with the low bidders.

You've got to bid this one low!

Here's how the districts—and the consulting board—are apt to work it for the 1955 bidding on Donnells and Beardsley:

First, assume a bond interest rate —and a pessimistic one! This will determine the bonding capacity. Then subtract out irrigation districts' requirements for overhead and engineering. The remainder, expressed in separate sub-totals for each project unit, will be a measure of money available for construction and contingencies. Based on project cost estimates, the consulting board will have pegged the contingency figures. What remains thereafter represents the top total bid that the districts can consider, on a strictly unit-price basis.

Bidders will know all these figures in advance, and with the understanding that total payments for over-runs cannot exceed the "ceiling" established in the contingency allowance. Of course, bidders will be free to make their own bond market studies, and may thereby be convinced that construction funds will exceed the districts' estimate.

Then too, some bidder could get lucky by correctly anticipating a higher bond interest rate—lower total construction funds—and holding his own bid down accordingly. He could wind up as the only man in the running after the bond issue had been

PRINCIPAL ITEMS OF WORK AND QUANTITIES

BEARDSLEY DAM AND POWER PLANT	Unit	Estimated Quantity
Excavation, diversion tunnel (17½-ft. horseshoe)	lin. ft.	1,600
Foundation excavation	cu. yd.	300,000
Spillway excavation	cu. yd.	540,000
Embankment for main dam	cu. yd.	3,000,000
Concrete in tunnel and spillway	cu. yd.	34,000
Reinforcing steel	lb.	3,000,000
Radial gates and guides	lb.	600,000
Miscellaneous structural steel and metalwork	lb.	450,000
Steel penstock	lb.	500,000

DONNELLS DAM, TUNNEL AND PLANT	Unit	Estimated Quantity
Excavation, diversion tunnel (16-ft. horseshoe)	lin. ft.	1,200
Foundation excavation	cu. yd.	310,000
Spillway excavation	cu. yd.	55,000
Concrete in dam, thrust block and spillway	cu. yd.	247,000
Structural steel in radial gates and guides	lb.	425,000
Tunnel excavation (12½x13 ft.)	lin. ft.	37,900
Concrete in tunnel invert (entire length)	cu. yd.	7,000
Concrete in tunnel arch (where required)	cu. yd.	19,000
Reinforcing steel in tunnel	lb.	270,000
Steel penstock and plate steel lining	lb.	3,100,000
Foundation excavation for plant	cu. yd.	15,000
Reinforcing steel in plant	lb.	500,000
Structural, misc. steel in powerhouse and switchyard	lb.	170,000

marketed. In this connection, it should be noted that the lower the basic bids received, the greater becomes the margin available for contingency, and the greater also the market ability of bonds. (The risk to bond buyers is less, at any rate. And only the availability of other bond issues also on the market would act to raise the rate of interest.)

The system of bidding outlined above spreads the risk about as equitably as possible. Certainly it shows the bidders what they must shoot for—or, more aptly, the ceiling they must get under. In this regard the bond people talk dismally about every bidder shooting for the maximum money known to be available. Such people just don't know how competitive bidding works, and they certainly don't know the especially competitive situation that exists in heavy construction today!

Donnells cheaper now

The question comes up as to what other changes in the project are contributing to its improved feasibility today—besides deferment of Tulloch unit. The biggest item is assignment of a 4-yr. construction period to Donnells Dam, its power tunnel, penstock and powerhouse. As bid in 1953 this was a 3-yr. job, and the bidding reflected the opinion that this would be a case of "doing the impossible." General Construction, Pacific Bridge, Shea, and Kaiser were low at $8,201,567 on the dam itself, $7,119,487 on the tunnel and penstock, and $1,251,545 on the powerhouse. Total $16,572,599—for the three bid schedules if they were all awarded together.

The 3-yr. plan at that time meant getting down into the riverbed, and out again (to streambed level), during the first season. Stretching it to 4 yr. means having an extra season at the start for plant construction, road building, abutment stripping, diversion preparations, etc. Addition of overhead expense under the present plan should be less than the former cost of a rush job, with its accompanying overtime and heavy investment in large-capacity plant and equipment.

Just two contracts

Beardsley remains a 3-yr. job, and the change on Donnells has had the effect of requiring one more legal step by the irrigation districts. Existing California law limits the construction period of bond-financed public works by setting 3 yr. as the maximum period for interest-during-construction payments. Special legislation approved by the Irrigation Districts Association has been introduced in the California legislature to amend the California Water Code in this respect (extending the interest-during-construction period to 4 yr.), and no difficulty is expected.

Another factor changing the total cost picture is organizing the work into just two prime contracts. Land clearing and similar work will still be separate. But the dam and power features will comprise just one contract each for Donnells and Beardsley. Beardsley Dam and its powerhouse were one unit in 1953, also. Low bid on that unit was $7,926,673, by Winston Bros. Co., and Al Johnson Construction Co.

A new addition to both bid schedules this time will be items covering all operating and generating machinery, formerly to have been supplied by the irrigation districts under separate contracts.

This is Donnells

Structural changes in the work are minor. Donnells Dam (el. 4.916) remains a constant-angle concrete arch structure, flanked by a gate-controlled spillway in a notch through the left abutment. Plans show it to have a height of 288 ft., volume of 247,000 cu. yd., and crest length of 760 ft. Original specifications for Donnells permitted an alternate method for foundation treatment, but addenda prior to the 1953 bidding had the practical effect of killing the possible advantages of the alternate. The specifications and addenda remain unchanged in this respect.

Donnells power tunnel will be 7.2 mi. long, a 12½x13-ft. horseshoe section with paved invert, driven through generally good, massive granite formations. Foundation conditions for the powerhouse are equally good—sound, firm granite. A 6-ft. diameter steel penstock will serve the powerhouse, which will have an installed capacity of 54,000 kw.

And this is Beardsley

Beardsley Dam (el. 3,397), the rockfill, has been changed very slightly by the designers, International Engineering Co., as a result of recommendations following state inspection of the plans and site. The change contemplates moving the center portion of the structure upstream about 100 ft., resulting in a curved crest rather than a straight one. Abutments remain as before, and total quantities are substantially the same.

Beardsley will be 280 ft. high, with a vertical impervious core and a volume of 3,000,000 cu. yd. The spillway will be a gate-controlled weir at the right bank, discharging into a chute cut in rock. The powerhouse (10,000 kw.) will be on the right bank at the toe of the dam. Work on this unit includes a 30-ft. afterbay dam about 1 mi. downstream.

Site conditions over the entire project are the same as in 1953, and there have been no further borings or other physical investigations made to assist bidders. No grading or clearing has been done. One change in access to Donnells results from work on the nearby state highway. Formerly closed during the winter at Pinecrest, it meant difficulty of winter work at Donnells. Reconstruction of 12 mi. now means a road that can be plowed clear of snow. The state may undertake the chore as regular maintenance, because of resorts now accessible by the improved alignment. This would mean an advantage to the Donnells contractor; but he could keep the road open himself, along with 4 mi. of project road.

A brief review of the physical aspects of the Tri-Dam Project was published in **Western Construction** in November 1952. Construction bids received on all schedules in 1953 were tabulated in **Western Construction** for June 1953. And the fortunes of the project since then—pertaining mainly to special enabling federal legislation—were published in February and May 1954.

A federal "assist"?

The federal legislation was introduced to restore project financial reserves lost to the tightened-up bond market of 1953. The proposed bill would provide a fund of $10,370,000 to be available to the irrigation districts for completion of the project if necessary. The legislation failed of passage, largely because there was not sufficient time available in the closing days of the 83rd Congress. Federal assistance will be sought again during the coming session of Congress, but construction plans do not depend on the results of this action.

The present plan for stage construction has been enabled only by agreement between the Oakdale and South San Joaquin districts and Pacific Gas and Electric Co., whereby revenues for the individual project units could be broken up and separately identified. As evidenced by firmly announced plans at this time, the separation is wholly feasible; the necessary changes have been effected as described, but the power contract has not yet been formally revised.

The man who knows

B. W. Goodenough, chief construction engineer for the irrigation districts in 1953, was subsequently consulting engineer to the Oakdale district alone. Now, however, he is consulting engineer for both Oakdale and South San Joaquin, with full authority to conduct work and initiate steps necessary to bring the project to both construction and bond bidding stages.

All inquiries about the work should be directed to Goodenough, who maintains temporary offices with the Rosendahl Corporation, Room 1512, Shell Building, 100 Bush Street, San Francisco 4, California.

How to go about an estimate (if you're new at it!)

Here are the problems, pitfalls, and obstacles that the beginner engineer estimator can expect to encounter in preparing estimates — and an approach to their proper preparation

By W. EARLE ROCHE
Glendale, California
Construction Consultant

THERE EXISTS NO ROSY ROAD to success and this is something all of us have to find out for ourselves. However, the time that it takes to become a successful estimator, depends to a large extent upon the person, upon the physical condition, character, education, experience, conduct, ambition—nearly all of which are to a large extent under the control of the individual himself. The experienced engineer estimator or successful contractor will probably find little of interest in this article, though had it been written and available some years ago, it might at that time have been of some value to their estimating procedure. The problems confronting inexperienced engineer estimators in approaching their first assignment, involving the determination of construction costs, should be evident in view of the limited extent of technical education that is available today on the subject from many of our leading engineering universities.

In preparing his first estimate, the beginner has reason to feel perplexed. Naturally, an engineer or any other person not properly equipped with the necessary amount of basic training and experience, does not know where to begin or the correct method by which to proceed with the preparation of complicated estimates of construction costs.

Types of estimates

Technical training is highly desirable and essential to all persons that engage in estimating, but this technical knowledge must be associated with a considerable amount of practical experience to enable him to prepare reliable estimates of costs for a variety of construction projects. Estimating is no job for a clock-watcher. Long hours, extensive traveling, a large amount of research work, and close attention to details will be required.

Since there are so many kinds of estimates involved with construction projects, the name and purpose, or the kind of estimate, to which this article pertains should be explained. This article is limited to the procedure of estimating the costs of general engineering construction work, consisting of (1) construction work item costs, (2) construction plant costs, (3) construction general and indirect costs, (4) summarization of costs and allowances for the three major divisions of construction costs named above, (5) cost adjustments, applied to the costs determined for the three major divisions of cost, to cover increments that are anticipated will take place during the construction period, (6) the write-up consisting of contingent and profit allowance, (7) total of the estimate or proposal.

The inexperienced engineer estimator will find it necessary to obtain a working knowledge of these major divisions of construction costs and subdivisions if intelligent procedure is to become possible and reliable estimates produced. This kind or class of estimating is commonly referred to as estimating construction costs—or preparing a construction estimate. It is usually, but not always associated with determining costs for the purpose of preparing and submitting competitive proposals. Or, it may provide an estimate of costs for day labor, or cost plus construction work.

Construction costs that are safe to apply cannot be determined through reading the abstracts of construction proposals that make their appearance in many of our technical magazines and daily construction reports. These unit prices and amounts in no sense represent construction costs for the various items of work. Such figures are merely bid prices and amounts to be incorporated in the contract agreement covering work performance. Their express purpose is to regulate, along with other contract provisions, the compensations to be paid by the work authority, or owner, to the contractor for performance of the construction work involved.

What costs to use

The figures commonly used by work authorities, engineers and architects to present the cost of a structure or project are in most cases only assumptions derived from bid prices and amounts offered for similar work. The latter may have been determined from the application of conventional cost coefficients that are based upon areas, cubical contents, or upon some other unit of measurement of the work involved. These figures do not in any way represent construction costs, which can only be determined by step-by-step systematic procedure. Therefore, construction costs can only be properly determined by (1) a process of analysis, or (2) from actual cost records associated with the performance of a similar class of construction work that was performed, to some extent, parallel to the work for which costs are to be determined.

Estimating procedure consists of a great deal more than merely reading the specifications, scanning the plans, making quantity and material surveys, obtaining prices and quotations on materials, supplies, and equipment that are involved. Field work conditions should for all projects be thoroughly investigated through a personal examination of the site of

About the author . . .

With 50 years of personal construction experience and over $4,000,000,000 of estimates and reports to back up his "Methods", the author is in a good position to give a few words of advice to the beginner estimator.

Roche's first publication was an estimating manual prepared in 1938 entitled, "Preparation of Proposals for Construction Work." This was followed in 1952 with the publishing of "Roche Estimating Methods." The latter provides detail on the subject of preparing estimates of construction costs using forms that had been developed by the author. —Editor.

Here are additional qualifications for a good estimator

It is no wonder the inexperienced engineer estimator is perplexed and proceeds with considerable misgivings regarding the sufficiency of the estimate that he is engaged in preparing. A solution to the problems which he faces involves numerous requirements such as a definite knowledge of work conditions, cost of materials and supplies, availability of trained work forces, a precise knowledge of labor wage rates, of labor working rules and employment regulations. The estimator must determine what kind of construction plant is available or will be required, what rates of output can safely be assigned or applied to the plant selected, how will the costs of construction plant be charged for, and what will be the use period for the construction plant that is selected. He must determine what office and supervisory forces will be required, their rate of compensation and how long their services will be required. He must evaluate costs that are related to protective insurance rates, premiums for workmen compensation insurance, employer's social security payroll contributions, welfare and pension fund payroll contributions that are assessed to the employer, and the special and general taxes that may be involved.

And more yet!

This is only the beginning—the estimator must decide whether the estimated costs that have been determined can safely be maintained throughout the construction period, whether quoted prices of materials, supplies, and institutional equipment are firm and will remain so. Also, can the labor wage rates and overtime pay allowances, upon which construction costs are based, be maintained throughout the construction period.

Finally, the estimator must decide upon the cost adjustments and the amount of contingent allowance that should be applied to the estimated costs to produce a safe venture. Profit allowance will depend upon competitive conditions, decisions of the principals, or the purpose for which the estimate is prepared. There are also matters related to climatological phenomena that exert considerable effect upon work progress and costs. This last item can affect the length of the active construction period, the quantity of construction plant that is necessary, and the size of the work force.

the work. This will provide the estimator with precise knowledge of the local conditions under which the work is to be performed. The estimator may be responsible for a fractional portion of the estimate, or he may be responsible for the estimate as a whole. Team work may be required, or he may be obliged to go it alone. A firm resolution on the part of the engineer estimator, to the effect that he will not undertake to prepare estimates of cost for construction work without first having made a personal inspection of the site of the work, will be certain to eliminate a large amount of underestimation.

Necessary information

There are many classes of construction work information that the beginner should strive to obtain and have available at all times to assist him in the preparation of estimates. Described in their probable order of importance, the information groups are: (1) the description, costs, and other information relating to construction materials and supplies, institutional equipment, and furnishings, (2) the description and costs of conventional construction plant and equipment, plant use charges and rates of allowable depreciation, (3) information related to construction general and indirect costs, (4) the typical operating costs of conventional construction plant, machinery and equipment units, (5) the typical construction work item costs for a variety of common work operations, (6) prevailing labor wage rates by trades and other classifications, union working rules, overtime pay rates, (7) abstract of unit bid prices and amounts for various classes of construction work, and (8) construction work check lists that can be used for the purpose of arranging and outlining construction estimates.

The last item (8) is to assist in making such estimates as complete in their scope as is humanly possible. This is considered a highly important phase of estimating procedure and necessitates possessions of classified check lists that can be quickly applied. First, it will assist in outlining the various divisions of cost of the estimate; second, it will serve as a means for testing the sufficiency of the estimate after it has been prepared to determine if all of the associated costs have been properly considered and taken into account.

To be properly equipped to make exhaustive field investigations and to efficiently perform the office work associated with construction estimates are equally as important as the possession of technical education and practical experience. The beginner should realize that estimates prepared for construction work must be organized and arranged in such a manner that they may be readily amended whenever necessary. Cost allowances may be revised, increased, or decreased as a better knowledge and understanding of work conditions and other related matter is obtained, or when specifications, plans, and work quantities are changed or altered by the work authority. If the estimate of cost is thrown into confusion by changes and revisions, then the estimating methods that are employed should be construed as impractical—and a change of procedure becomes essential. To avoid these difficulties, construction estimates of costs should be prepared by methods that permit flexibility without destroying the arrangement of the estimate and confusing the results that the engineer estimator seeks to attain. Haphazard, poorly arranged construction estimates, even though made by experienced estimators, often result from lack of systematic estimating procedures. The possession and use of proper stationery, estimating forms, binders and indexes by which to record and present information is a necessity.

Accurate determination of construction costs is the medium through which a profitable venture is assured and losses and deficits are prevented. A construction organization with its valuable personnel and plant and equipment is worn out and dissipated through the senseless procedure of submitting improperly prepared bids. This occurs when a large volume of work has been secured only to discover during the performance period that 50% to 75% of the work develops a loss.

No more bids below cost

With adequate information and properly prepared estimates of cost, bids that were below cost for the larger percentage of the work need never have been filed. The loss would not have developed and the remaining 25% to 50% of the work would have produced a profit that could have been retained and not plowed back to cover deficits produced from performance of the work taken below cost. There is also the additional loss factor of construction plant and equipment dissipated and worn out in performing that portion of the work that produced the loss. Contractors that are successful must continue to be active and obtain work under exacting competitive conditions. This requires estimates at prices and amounts that, when coupled with efficient work performance, will yield a profit upon completion of the project.

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Uncertain delivery, high cost of timber and steel, so Idaho uses—

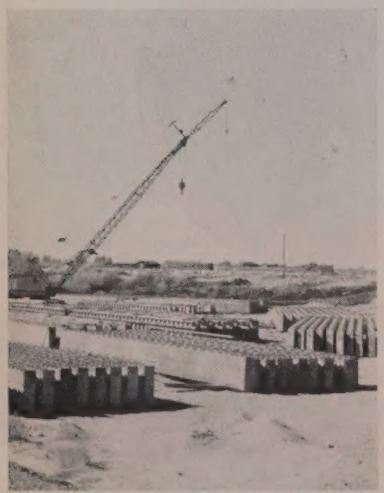
Precast concrete stringer bridges

By WALTER ALBRETHSEN
Bridge Engineer
Idaho Department of Highways

DURING 1953 and 1954 Idaho built 12 bridges having superstructures of precast concrete stringers with poured-in-place concrete floors and pile bent substructures.

The reason for the study that resulted in the design of this type of structure was the uncertain delivery of timber and structural steel and the increased cost of these materials relative to the increase in cost of reinforced concrete in Idaho.

The conventional poured-in-place reinforced concrete structures are still being used for bridges where foundation conditions permit the use of falsework at a reasonable cost. However, for bridges where piling can be driven or the falsework for poured-in-place concrete is costly, the precast stringer type has been used extensively.



MONTGOMERY BRIDGE over Snake River at Rupert has large precasting yard near job site.

The rectangular precast stringer sections are designed to carry the stringer and floor dead-loads plus the form and construction loads. Shear keys are placed at the top of the beam which provides a T-beam section to carry the live load plus any part of the superstructure built after the concrete floor is completed. Reinforcing steel is provided to take care of the dead load stresses carried by the rectangular section plus the live load stresses carried by the T-beam section. Also reinforcing steel is placed in the top of the stringers to provide for stresses induced during construction.

The structures are designed in accordance with the 1953 A.A.S.H.O. Specifications and for the live loading shown in the table.

The substructures for bridges on the Primary and Interstate Highway Systems are concrete filled 14-in. steel shell pile bents. Enclosed treated timber pile bents have been used for some of the County Secondary System bridges.

With proper planning by the contractor, this type of construction provides for full utilization of all classes of labor. Also, very little delay occurs during construction as the contractor can precast the stringers during the time the pile bents and pile caps are being constructed.

How much do they cost?

THE FOLLOWING TABLE shows the general information for the bridges of this type and the contract price per square foot based on the out-to-out width and out-to-out length of the structures built by the State of Idaho.

	Location	River	Pile substructure	Loading	Clear width between curbs	Out-to-out width	Out-to-out length	Cost per square foot
a	Rupert	Snake	35′ Steel Shell	H20-S16	28′	32′-8″	960′	$5.71
b	Heyburn	Snake	50′ Steel Shell	H20-S16	28′	32′-8″	1310′	6.50
c	Parker	Henrys Fk. Snake	28′ Trtd. Timber	H-15	24′	26′-6″	186′	5.20
d	Tetonia	Teton	20′ Steel Shell	H20-S16	28′	32′-8″	150′	5.89
c	Newdale	Teton	55′ Trtd. Timber	H-15	24′	26′-6″	155′	7.27
c	Middleton	Boise	28′ Trtd. Timber	H-15	24′	26′-6″	403′	5.50
d	Parma	Boise	25′ Trtd. Timber	H-15	22′	24′-6″	330′	5.24
e	Barber	Boise	30′ Trtd. Timber	H15-S12	24′	26′-6″	315′	6.24
a	Cambridge	Weiser	35′ Steel Shell	H20-S16	28′	32′-8″	160′	6.82
a	Terrington	Canal	35′ Steel Shell	H20-S16	28′	32′-8″	120′	6.42
e	Clarkia	St. Maries	30′ Trtd. Timber	H15-S12	26′	28′-6″	105′	7.15
e	Cleveland	Bear	30′ Trtd. Timber	H15-S12	26′	28′-6″	280′	6.27

a 40 ft. Bent Spacing.
b 40 ft. Bent Spacing with 4 tower spans.
c 31 ft. Bent Spacing.
d 30 ft. Bent Spacing.
e 35 ft. Bent Spacing.

Colorado gets proper highway alignment by economic study

The author says, "With modern earth moving equipment the cost to excavate an extra few thousand cubic yards of soil is negligible when compared with cost of vehicle operation in going 'out of direction'"

By THURLOW C. RESEIGH
Roadway Plans Engineer
Colorado Department of Highways

ON MANY SECTIONS of highways in the state of Colorado it appears that the cost of vehicle operation to road users, after the road was built, was not given much weight in the selection of original alignment. Probably the primary consideration on these original highways was to select an alignment with minimum cuts and fills and where right-of-way was already state or county owned in order to build a road requiring minimum initial funds. Once a section of highway is constructed "out of direction" the motorists usually travel it for 20 or more years before funds are again appropriated for reconstruction of that section.

On most of these highways that are "out of direction" the initial additional cost to build them "in direction" is usually negligible when compared with the additional cost of vehicle operation, time, etc., to road users for a 20-yr. period or longer. In that the motorists or road users who spend money to go "out of direction" once a highway is built are the same people who pay the cost of initial construction, it appears that the economics of new alignment should be investigated very thoroughly over a 20-yr. period or longer before a highway is ever built.

For the past several years, on projects whose alignment appears to be "out of direction" the Surveys and Plans Division of the Colorado Department of Highways has been comparing the cost of reconstruction along this present "out of direction" alignment plus the cost of vehicle operation to road users for a 20- to 30-yr. period with the cost of construction of "in direction" alignment plus the cost to road users on this alignment in the form of an economic analysis. In most instances these economic analyses have been of great aid in selecting proper alignment.

Almost always the initial cost of construction along new "in direction" alignment is greater than re-construction along existing "out of direction" alignment because cuts and fills are heavier and a larger amount of new right-of-way is required to construct the highway to latest geometric design standards. However, when the cost of vehicle operation to road users for a 20- to 30-yr. period is determined, the savings to road users in vehicle operations cost on the "in direction" alignment will usually pay for the added initial cost of construction in two or three years.

This article will present the details of one economic analysis that was made on a section of secondary highway in 1953 and discuss another analysis that was made on the interstate system in 1954.

On a number of sections on the secondary system the alignment follows section lines and makes several right-angle bends and eventually winds its way to the next town. The question that comes up when reconstructing this road is—Is it more economical to diagonal across several sections and eliminate these right-angle bends and shorten the distance of travel, or should the appropriated funds be spent on reconstruction along present alignment, in order to serve property owners along that alignment? Of course there is no standard solution to this problem and each case must be studied separately. The answer depends on:

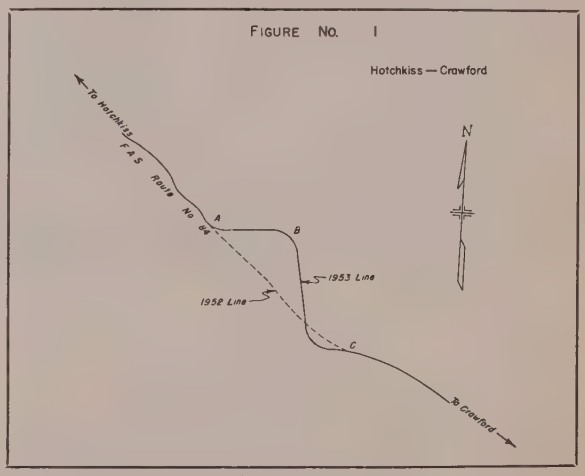
1. Volume of through traffic on section under question.
2. Volume of local traffic generated on section under question.
3. Value of land and cost of damages due to severance.
4. Cost of construction of new alignment as compared with cost of reconstruction along present alignment.
5. Cost of maintenance of new alignment plus old alignment as compared with only maintaining present alignment.

Example No. 1

Figure No. 1 is a sketch of an alignment problem that came up on a section of secondary highway FAS Route No. 125 between the towns of Hotchkiss and Crawford in the state of Colorado.

In 1952 a line was surveyed, as indicated in sketch, which shortened this section of the route by 0.310 mi.

FIGURE No. 1



and eliminated near right-angles at points "A," "B," "C." Because this project was being financed partially with county money, the owners along the present road questioned whether the Department was doing right in cutting them off the main highway. These property owners contended that the secondary road in this area was actually a farm-to-market road and that it was not sound judgment to by-pass them. During the winter months the 1953 line which closely follows the present road was surveyed.

In order to analyze the problem and aid in the selection of proper alignment this economic analysis was made:

BASIC DATA

1. Length

1952 Line = 6,969.2 ft. = 1.320 mi.
1953 Line = 8,606.0 ft. = 1.630 mi.

2. Curvature

Curves less than 4 deg. are neglected as they have no appreciable effect in final results.

1952 Line	1953 Line
1—5-deg. Curve for 700 ft. on 0% to 3% Grade	2—5-deg. Curves for 750 ft. on 5% to 7% Grade
	1—7-deg. Curve for 1,300 ft. on 0% to 3% Grade
	1—8-deg. Curve for 500 ft. on 5% to 7% Grade
	1—9-deg. Curve for 1,000 ft. on 0% to 3% Grade

Increased cost of operation on curves expressed as a per cent of increase in cost over operating on tangents (from "Road Users Benefits Analyses for Highway Improvements" published by American Association of State Highway Officials 1952) is as follows:

5-deg. Curve = 7% greater than cost of operating on tangent.
7-deg. Curve = 10% " " " " " "
8-deg. Curve = 12% " " " " " "
9-deg. Curve = 14% " " " " " "

3. Tabulation of Grades

Grades	1952 Line	1953 Line
0% to 3%	2,771.9 ft. = 0.525 mi.	3,613.9 ft. = 0.685 mi.
* 0% to 3%	700.0 ft. = 0.133 mi.	.....
♂ 0% to 3%	.....	1,300.0 ft. = 0.246 mi.
Δ 0% to 3%	.....	1,000.0 ft. = 0.189 mi.
3% to 5%	1,600.0 ft. = 0.303 mi.	950.0 ft. = 0.180 mi.
5% to 7%	1,897.3 ft. = 0.359 mi.	492.1 ft. = 0.093 mi.
# 5% to 7%	.....	750.0 ft. = 0.142 mi.
§ 5% to 7%	.....	500.0 ft. = 0.095 mi.
TOTALS....	6.969.2 ft. = 1.320 mi.	8,606.0 ft. = 1.630 mi.

* On 5-deg. Curve ♂ On 7-deg. Curve Δ On 9-deg. Curve
# On 5-deg. Curve § On 8-deg. Curve

4. Traffic

Traffic volume map of 1952 shows 300 vehicles per day (v.p.d.) just south of Hotchkiss and 300 v.p.d. just north of Crawford and 200 v.p.d. midway between.

Average Traffic Volume (1952) $= \frac{300+200+300}{3} = 270$ v.p.d.

Traffic Volume (estimated 20 yr. hence) $= 270 \times 1.65 = 450$ v.p.d.

Average Traffic Volume over 20 yr. period $= \frac{270+450}{2} = 360$ v.p.d.

Estimated per cent of commercial vehicles is 30%.
Estimated cost of operation of commercial vehicles is 3.5 times the cost of operation of passenger vehicles.
30% of 360 = 110 commercial v.p.d.
110 × 3.5 = 385 equivalent passenger v.p.d.
Total equivalent passenger vehicle volume equals
360 − 110 + 385 = 635 v.p.d. or
635 × 365 = 231,775 equivalent passenger vehicles per year.

5. Vehicle Operations Costs (from above-mentioned AASHO publication)

The following are estimated costs of **passenger** vehicle operation on a tangent 2-lane highway with pavement in good condition at speed of 44 mph.

0% to 3% Grades = 7.26 cents per mi.
3% to 5% Grades = 7.42 cents per mi.
5% to 7% Grades = 7.70 cents per mi.

These costs include fuel, tires, oil, maintenance and repairs, depreciation, time, comfort and convenience.

TOTAL ANNUAL ROAD USERS COSTS

1952 Line

Grades	Miles	Cost per mile	Vehicles per year	Correction for curvature	
0% to 3%	= 0.525	× $0.0726	× 231,775		= $ 8,834.10
* 0% to 3%	= 0.133	× $0.0726	× 231,775	× 1.07	= $ 2,394.63
3% to 5%	= 0.303	× $0.0742	× 231,775		= $ 5,210.90
5% to 7%	= 0.359	× $0.0770	× 231,775		= $ 6,406.95
TOTAL COSTS.....					$22,846.58

1953 Line

Grades	Miles	Cost per mile	Vehicles per year	Correction for curvature	
0% to 3%	= 0.685	× $0.0726	× 231,775		= $11,526.40
* 0% to 3%	= 0.246	× $0.0726	× 231,775	× 1.10	= $ 4,553.35
* 0% to 3%	= 0.189	× $0.0726	× 231,775	× 1.14	= $ 3,625.51
3% to 5%	= 0.180	× $0.0742	× 231,775		= $ 3,095.58
5% to 7%	= 0.093	× $0.0770	× 231,775		= $ 1,659.74
* 5% to 7%	= 0.142	× $0.0770	× 231,775	× 1.07	= $ 2,711.62
* 5% to 7%	= 0.095	× $0.0770	× 231,775	× 1.12	= $ 1,898.88
TOTAL COSTS.....					$29,071.08

* Includes factors for correcting for curvature.

Cost to road users for 20-year period

1952 Line − ($22,846.58 × 20) = $456,931.60
1953 Line − ($29,071.08 × 20) = $581,421.60

CONSTRUCTION AND R.O.W. COSTS

	1952 Line	1953 Line
Initial Construction	$72,300	$71,500

Right-of-way — Estimated at $3,000 per mile for strip 100 ft. wide on 1952 Line; and $1,000 per mile along 1953 Line.

R.O.W. Costs

1952 Line = 1.320 × $3,000 = $3,960
1953 Line = 1.630 × $1,000 = $1,630

Total Costs for R.O.W. and Construction

	1952 Line	1953 Line
Construction	$72,300	$71,500
R.O.W.	$ 3,960	$ 1,630
TOTAL.....	$76,260	$73,130

MAINTENANCE COSTS

Annual maintenance cost on new road (either line) is estimated at $400 per mile per year.

Annual maintenance cost required to keep open present road for 12 home-owners in case 1952 line is built is estimated at $200 per mile per year.

Total Annual Cost of Maintenance

1952 Line = (1.320 × $400) + (1.630 × $200) = $854
1953 Line = (1.630 × $400) = $652

Total Cost for Maintenance for 20-year Period

1952 Line ($854 × 20) = $17,080
1953 Line ($652 × 20) = $13,040

TOTAL COST OF INITIAL CONSTRUCTION PLUS 20 YEARS OF MAINTENANCE

1952 Line ($76,260 + $17,080) = $93,340
1953 Line ($73,130 + $13,040) = $86,170

SUMMARY OF COSTS

	20-year costs of construction and maintenance	20 years of road users costs
1952 Line.....	$93,350	$456,931.60
1953 Line.....	$86,170	$581,421.60
Difference.....	$ 7,170	$124,490.00

This means (if the 1952 line is constructed) that for an investment of $7,170 for initial construction and maintenance (over a 20-yr. period) that road users will save $124,490 in cost of vehicle operation during that period on this short section of highway.

It is easier to understand how good an investment this is by determining what per cent of interest on an investment of $7,170 compounded annually for 20 years will produce $124,490. The answer is 15+%. Where else can road users invest money at 15+% interest?

If a **"benefits ratio"** is desired for the purpose of comparison of this alignment improvement with similar problems in other sections of the state it can be set up as follows:

A benefits ratio (BR) is the difference in road users cost divided by the difference in construction and maintenance costs.

$$BR = \frac{\$581,421.60 - \$456,931.60}{\$\ 93,340.00 - \$\ 86,170.00} = 18.4$$

With this analysis it appeared sound judgment to diagonal across the section, or construct along the 1952 surveyed line and maintain the present road for the 12± owners who would be cut off of the main secondary route by this construction.

Plans for this project were completed on this basis and

200 cubic yards an hour on a 1500-foot haul

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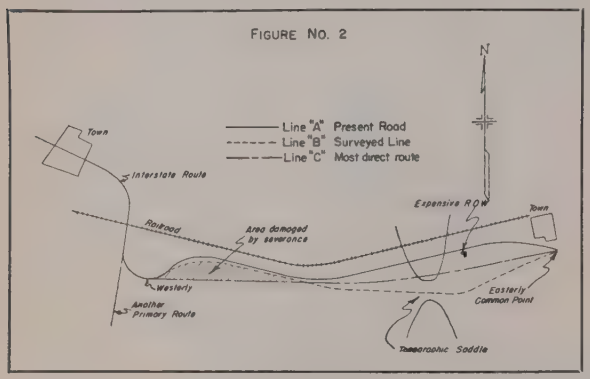
the project is now under contract with completion expected in the fall of 1954.

Example No. 2

In 1954 funds were made available for reconstruction of a nine mile section of highway on the Interstate system.

Between the east and west termini of this section there were three lines under consideration. Line "A" was strictly reconstruction along the present road which also



paralleled the railroad; Line "B" paralleled present road for its westerly portion so as to avoid severance of property, but for its easterly portion it left the present road, in order to avoid costly right-of-way, and also went slightly out of direction in order to hit topographic saddle and thereby reduce excavation quantities; Line "C" was the most direct route without getting involved in additional railroad crossings.

Figure No. 2 is a sketch showing the three lines.

Lengths of each of these lines between easterly and westerly common points are as follows:

Line "A" = 8.814 mi.
Line "B" = 8.808 mi.
Line "C" = 8.713 mi.

Preliminary estimates which included cost of construction, right-of-way, access rights and damages by severance indicated that Line "B" would cost less than both Line "A" and Line "C." Line "A" could not be eliminated because it not only cost more to reconstruct but was also slightly longer in length and would therefore cost more to road users in cost of vehicle operation.

The cost of construction and right-of-way on Line "C" was determined to be $15,000 greater than the cost of construction and right-of-way of Line "B." The savings in distance was only 0.095 mi. (500± feet). The question then was—would this savings in distance of only 500± feet justify an additional expenditure of $15,000 in order to obtain the most direct route?

Working with only present traffic volumes on this route, the 20-yr. savings to road users in cost of vehicle operation would not definitely justify the added initial cost. However, if another item, which is "probable transfer traffic" is introduced into this analysis, the results are considerably changed.

This Interstate highway in Colorado appears to have been selected along the most direct route. At the present time this route is not in as good a state of repair as other possible routes in the vicinity and during its original construction it probably was not built to as high a standard as other possible routes. However, when completed to Interstate design standards—and that it is the most direct route—it was considered safe to assume that there would eventually be a transfer of 10% to 15% passenger vehicles and possibly as high as 40% trucks on to this route from other routes leading into Colorado in this vicinity.

When this "transfer traffic volume" is added to the existing traffic volume and the analysis reworked, the savings to road users in vehicle operations cost on Line "C" over Line "B" amounts to $10,000± per year. Plans for this project are not yet completed.

CONCLUSIONS

The use of "economic analyses" for aiding in the selection of proper alignment has definitely been of benefit in several ways.

1. With economic analysis, those responsible for making final decisions on alignment have been able to make these decisions in much shorter time which speeds up plan preparation and subsequent placing of projects under contract.

2. The contract analyses give definite written economic facts to back up a decision.

3. Study of economic analyses that have been made, so far, has definitely shown that alignment should not be taken "out of direction" in order to obtain minimum earthwork quantities. With modern earth moving equipment the cost to excavate an extra few thousand cubic yards of soil in order to stay "in direction" is negligible when compared with cost of vehicle operation to road users to go "out of direction."

While economic analyses have definitely been of some benefit during the past several years in Colorado, it now appears that we could derive even greater benefits if the economics of "out of direction" alignment was known in advance of the budgeting of any funds for a project.

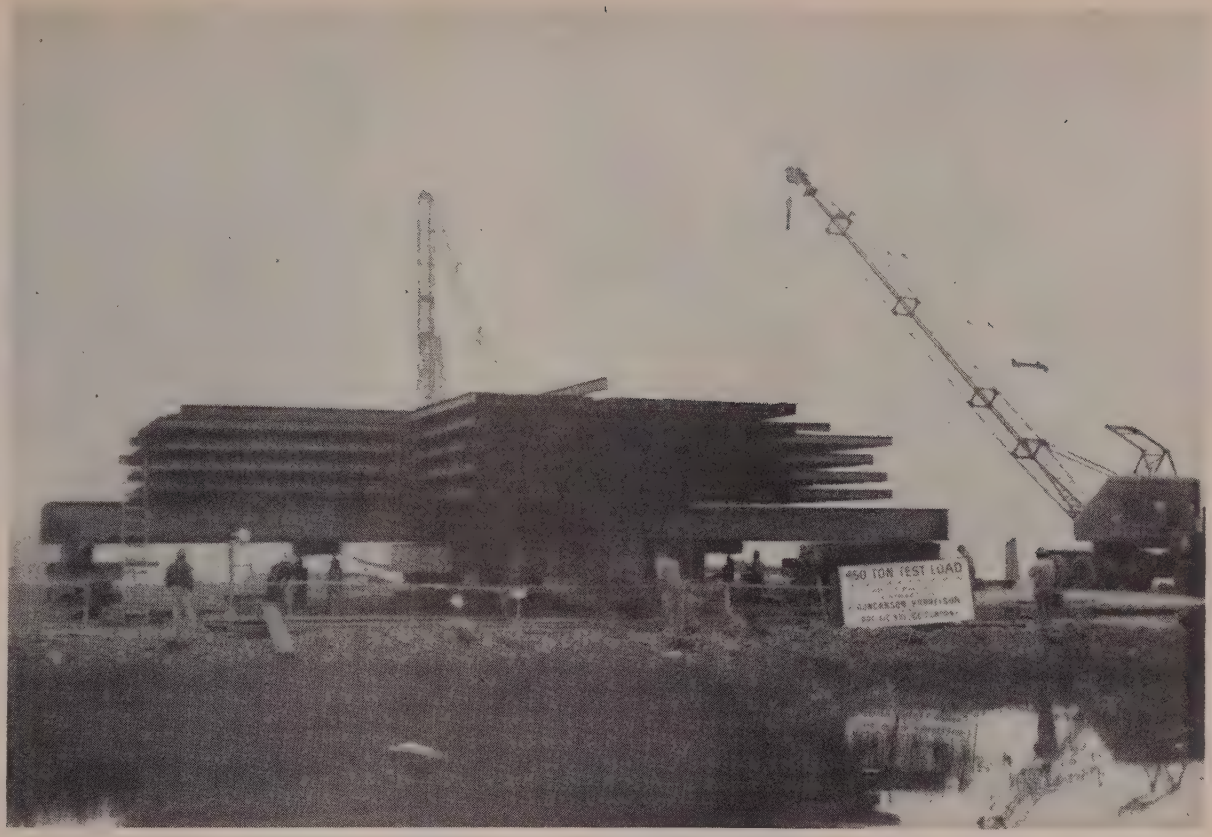
So far, economic analyses have been made after funds were budgeted for a project and after considerable money had already been spent on preliminary surveys. The fact that another survey increases engineering costs and delays placing a project under contract has often influenced the decision to construct along the surveyed line even though an analysis might show a more direct route will actually give the most benefits to road users considering a 20-yr. period.

A possible solution to this problem might be to study the alignment of all highways in the state, and where the alignment could be improved, preliminary economic analyses could be prepared and completed in the form of a benefits ratio (similar to what has been done in the State of Oregon.) The preliminary economic analysis should be prepared along the most direct route. U.S.G.S. quadrangle maps, aerial photographs, and any other available information could be used in preparation of necessary alignment and profile data required in order to arrive at estimated cost of construction. The benefits ratio resulting from preliminary analyses could then be placed on a map of Colorado.

Then, when funds are appropriated and a survey is to be made on this section, the engineer making the survey would have a definite idea of what it will cost road users if the alignment he surveys goes out of direction. After the engineer responsible for the survey has studied the situation, looked over the most direct route, and possibly surveyed a fly line on this route and on other possible locations, he could then make more accurate economic analyses on the several possible locations and select the route having the highest benefits ratio for his final location. In this way the road users would always be considered in alignment problems.

A map or tabulation showing benefits ratios prepared as suggested above would also be of use to those who set up the annual budget for projects to be constructed each year. When funds are set up for reconstruction along a particular route the unsafe sections are, in all probability, given first priority in the reconstruction program. Then, if maintenance costs are approximately the same on the rest of the rural route, the section having the highest benefits ratio should probably be considered next for reconstruction as its improvement would actually reflect the greatest savings to road users who, incidentally, are the same people putting up the fund to be budgeted.

Comments from department engineers and from other Western states on how they solve the same or similar problems are invited.



135-ft. steel pile decreases 7/8 in. in length as—

450-ton test load is applied

ONE OF THE HEAVIEST test loads known to have been placed on a single steel bearing pile was conducted recently in preparation for the substructure of a new bridge in the San Francisco Bay area. The test load of 450 tons was twice the design load of the 238 similar piles that will support the finished structure. Requirements of the test were that the load last for 60 hr. and at the end of this period—that the pile rebound to within ¼ in. of its original elevation.

The manner in which this test was conducted proved to be an extremely interesting one. The juggling of 450 tons on one pile could be disastrous if not properly done. That it was done well, and to a satisfactory end result—credit should be given to The Duncanson-Harrelson Co. and Pacific Bridge Co., joint venturers on the general contract, and to the Ben C. Gerwick Co., subcontractor on the substructure.

The pile tested was a 135-ft. long, 14-in., 193-lb., wideflange section furnished by the Columbia-Geneva Steel Division. Two shorter lengths of 75 and 70 ft. were driven in 100-ft. leads to make the longer length and were butt welded during the driving process. A Vulcan 140-C hammer was used to drive the pile to refusal.

About 10 ft. of the top of the pile was burned off and then ground and sanded for a relatively smooth bearing surface. On top of this surface a 1/16-in. thick copper sheet was laid to further provide for minor surface irregularities. A network of beams crisscrossing at right angles was then built up for the total load. This consisted of a main grillage of fifteen 36-in., 170-lb., wideflange sections 80 ft. long. Accurate control of the loading came with further loading of 273 additional 10-in., 42-lb., H-sections, 60 to 65 ft. long to this main grillage.

Balancing heavy load

Timber cribs placed at the ends of the main grillage prevented teetering of the heavy load. To get as nearly as possible the exact load of 450 tons, the test pile was overloaded by 20 tons to a total of 470 tons. This load was then decreased by the use of six hydraulic jacks each registering about 3 tons that lifted up on the main grillage. With an equal reading on each jack (each one located the same distance from the test pile) the load was then known to be 450 tons and to be also accurately balanced on the test pile.

The 135-ft. length of the test pile was shortened ⅞ in. by the actual compression of the steel under the test load. A 1-ft. test rule tack welded by its two ends to the test pile was observed to bulge out from the pile about ⅛ in. at its midpoint. The pile under compression next to it had compressed but the rule did not. A plumb bob was suspended about 4 ft. from the test pile, but attached to it by a wood framework. Its purpose was to indicate rotation and lateral displacement.

Final results of the tests were completely satisfactory upon removing the load at the end of 60 hr. The pile rebounded to within ¼ in. of its original position, there was no rotation, and the lateral displacement of the top was also within ¼ in. of its original position.

For the general contractors George Fink is job superintendent. California state resident engineer is W. M. McAuley. Total bid amount for this test was put at $10,000.

Drills on tracks—

Buy 'em or build 'em

EFFORTS TO SAVE on equipment, time, and manpower on drilling jobs have prompted many contractors to combine their crawler tractors and drilling rigs into self-contained mobile units. Advantages claimed for this arrangement are several: (1) elimination of the centralized air plant and its attendant, which means absence of air line breaks due to freezing and blasting; (2) elimination of a crew to move the compressor and drill wagon; and (3) reduction of operator fatigue and drilling time.

Such a unit usually consists of a track-type tractor, one or two rock drills with 6- or 12-ft. feeds, an air receiver and a compressor unloader and engine throttle control. In addition, it requires a two stage air compressor, air or water cooled, similar to those used on portable air compressors, 125 to 600 cu. ft. of actual air delivery at 100 psi. For wet drilling a water tank can be mounted over one of the tracks, water pressure being obtained by a small air line from the air receiver. Air can be piped from the compressor and looped through the water tank, which then acts as an inter-cooler in summer and heats the water during winter operation.

The rigid support given by the hydraulic boom type operation has proven useful in ditch drilling, face drilling, and for other points not accessible to the tractor. The arm or mounting for a single rock drill can be positioned and held by a hydraulic arm.

Many contractors use an old tractor with a fairly good engine for this drilling use, but some have found the combination so convenient that they are purchasing new tractors for this purpose. Caterpillar Tractor Co. has announced that several compressor and rock drill manufacturers are prepared to supply a package consisting of compressor, drills, and mounting and brackets for mounting on Caterpillar track-type tractors.

THE ALCANGO PIPELINE: PART 1 OF 2

Designing 620 miles of trouble

What are the problems to consider when laying a pipeline through tundra, over mountains, under rivers?

ALASKA HAS a vital pipeline now under construction. When completed in 1955, the Alcango POL project will link Haines to Fairbanks with an 8-in. steel conduit for carrying petroleum products. This Far North facility, which is greatly needed for efficient, economical, and large-scale transportation of fuels to the large military bases in the Alaskan Interior, will connect the tankers, tied up in tidewater of the scenic Inside Passage's Lynn Canal, with the sprawling tank farms of the strategic military installations of Big Delta, Eielson, and Ladd.

The design and location of this pipeline close to the Arctic Circle presented many perplexing problems to be solved before the pipeliners were brought in to lay the line with their traditional push. The Fairbanks end was fixed, but the sea terminus had to be selected. A warm-water port, open all the year around was needed.

Alaska has a rainy "banana belt" along the southeastern panhandle coast, and the semiarid, cold Interior. In 1952, Haines recorded a snowfall of over 22 ft. and rainfall of 82 in. while the records of Fairbanks showed only 3 ft. of snow and 8 in. of rain. In the spring, the frozen streams break out of their confining ice and go on a breakup rampage. Flash floods are numerous, and washouts bring destruction. Pipeline crossings are extremely vulnerable to the terrific hydraulic power of the Alaskan rivers. The designers had to weigh all these powerful forces of nature.

Another phenomenon of the North Country had to be solved by the design engineers—the strange permafrost. The problem of this permanently frozen ground has not been solved satisfactorily.

Where to start?

When the Korean conflict started, the military planners carefully selected the pipeline route, weighing all the design problems pro and con with civilian experts. It was to run from Haines, an ice-free port on the beautiful Inside Passage near the upper end of the long narrow southeastern Alaska panhandle, to Fairbanks by way of the existing Haines Cutoff and Alcan Highways. Thus the rough route ranges from the humid, banana belt (Alaskan variety) of the tourists' scenic Inside Passage with mild climate and thawed soils to the snow-capped mountains of the St. Elias and Coastal Ranges to the flat tundra terrain east and north of the spectacular Alaska Range. Two hundred and ninety miles of the strategic pipeline are located in Canada.

In 1950, Ryall Engineering Co., Little Rock, Arkansas, contracted to make a preliminary location and aerial photography of the Alcango route. Fluor Corporation, Beverly Hills, California, entered the pipeline picture as architect-engineer for the Corps of Engineers in September of the same year.

After extensive study of construction problems in the field and a reconnaissance of the proposed route, Fluor started on the plans and specifications. The flash flood conditions were studied at first hand during the spring breakup. The records of the Canol pipelines were searched to help solve pipeline problems in the Far North. During World War II, the Canol pipeline was laid from Canada's Norman Wells oil field to a refinery at Whitehorse, and a 4-in. line.

8,500 TONS OF PIPE, slated for use in the 281-mi. Canadian portion of the project, was stockpiled at the port of Haines after shipment from England. British firms manufactured pipe for the Canadian portion, and American firms for the Alaskan stretches.

Canol No. 4, was installed from the tidewater of Skagway, Alaska, to Whitehorse for tanker delivery of petroleum products from the States to the Yukon Territory junction point. Canol No. 2, a 3-in. pipeline, was constructed from Whitehorse to Fairbanks. These early pipelines were better than no pipeline at all, but fell short in supplying the present huge bases of the Interior. The operational records of these pioneer pipelines provided valuable information for the design data of the new 8-in. Alcango. These small lines are surface-laid, unrestrained installations except for anchoring at a few critical points.

Designing underwater crossings

Stream crossings were given considerable thought and planning. Originally, it was decided to bury the pipeline under all the watercourses. But in 1952, the plans were revised and changes were made due to economic factors and the variable behavior of the rivers as it was seen that the uncertainties of future channel changes by the unpredictable, meandering rivers and later deepening of the stream beds could cause costly pipeline breaks and losses of petroleum products. The Alcango pipeline was relocated at major river crossings and use was made of existing highway bridges to carry the line across the Donjek, White, Robertson, Johnson, Big Gerstle, Salcha, and Tanana No. 1 and No. 2 Rivers. Other major streams will be crossed by 9-ft. burial below the stream beds. Minor stream crossings call for 7-ft. burial. The pipeline will be supported across small creeks and ravines overhead above the reach of flood stages.

Major stream burial crossings vary from a length of 3,800 ft. under Duke River to 100 ft. at Christmas Creek. Kluane Lake, the scenic spot on the Alcan Highway in Canada, called for a 42,532-ft. undercrossing of the 291-ft. deep lake. The successful contractor eliminated this big problem by selecting the bid's alternate route which circles the lovely lake. This land location, longer by 5.8 mi., follows the Alcan Highway around the south end of Kluane and crosses the delta mud flats of Slim's River. Much of the pipe on this changed location will be buried in solid rock and treacherous rock slide areas. It includes a 1,400-ft. underground crossing of Slim's River.

The size and quality of the pipe was the subject of many conferences. The final specifications call for 8-in. diameter Grade A, API Standard 5L, seamless, open-hearth steel pipe with a maximum low carbon content of 0.21% carbon for best results in this cold country. Elongation of 33.01% for pipe with 0.277-in. walls and 34.97% for 0.312-in. thickness were specified. The heavier walled pipe is to be used at stream crossings. The pipe has an elastic limit of 30,000 minimum psi. and tensile strength of 48,000 minimum psi. The pipeline will have ample safety factors to take care of the great temperature differential of 174 deg. F. with a high of 91 deg. F. above zero and a low of —83 deg.

PERMANENTLY frozen soil can become a bog if heavy equipment removes surface.

Approximately 122 mi. of the pipeline will be buried underground with the remaining 500 mi. being laid unrestrained above-ground. Expansion and contraction on the pipeline will be great. Slack will be provided by zigzagging the restrained buried pipe in the trench bottom. As the underground pipe will develop stress the "snaking" of installation will provide a condition so that the varying temperature stresses will act under the tensile strength. The cross-country surface-laid sections will take care of expansion and contraction by alternating curves. In rocky areas, vertical curves will allow the movement from temperature changes. Creep sideways on slopes will be combated by anchoring. At Snag where the temperature has varied 171.5 deg. F., from a high of +87.5 deg. F. to an all-time low of —83 deg., the surface-laid line will vary 5.89 ft. in length per mile. Fairbanks has a temperature differential of 157 deg., ranging from +91 to —66 deg.

A major award

The contract for this Alaskan pipeline project was awarded on October 29, 1953, to Williams Bros.-McLaughlin-Marwell of Tulsa, Oklahoma. The low bid of these pipeliners was $29,001,288, and the specified completion date is September 1, 1955. This project started work on December 22, 1953.

The construction is under the administration and inspection of the U. S. Army, Corps of Engineers, Alaska District. Colonel L. E. Seeman was the district engineer when the project was in the planning stages. Colonel Louis H. Foote was district engineer when the design was on the drafting boards, and Colonel Carl Y. Farrell is the present district engineer during the construction of the pipeline. The following Alaska District personnel have worked on the Alcango design: Warren George, chief of engineering division; Edwin J. Kreitlow, chief of POL design; Donald B. Slawson, chief of pavement section.

Headquarters, U. S. Army, Alaska, commanded by Major General Stanley L. Scott, and later by Major General J. W. Cunningham, had the following on the planning and design: Planning Branch—Major A. F. Moffitt, and Major B. Hobbeking; Engineers — Lt. Colonel B. E. Meadows, and Frederick Wolff.

Fluor Corporation, the architect-engineering firm which produced the developed design, detailed plans, and specifications, had the following men: C. M. Hawke, H. W. Sorenson, and G. D. Bachemin.

H. E. Blevens was in charge of the surveys and pipeline location for Ryall Engineering Co.

INTRUSION MORTAR for consolidating the preplaced aggregate was mixed and pumped from this floating plant. This relatively small set-up mixed and pumped enough mortar to consolidate up to 280 cu. yd. of preplaced coarse aggregate per day.

Prepakt encasement of outfall sewer

By LOUIS A. GERDINE
Regional Engineer
The Prepakt Concrete Co.

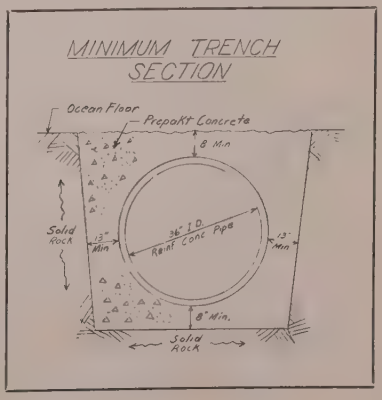
REPLACEMENT of the outfall sewer line from 800- to 2,000-ft. offshore for the city of Santa Cruz was completed late last year. This portion of the sewer, ranging in depth from 18 to 40 ft., had been torn away by storms sometime during the past two years.

The September 1954 issue of **Western Construction,** pages 68-69, carried a description of the overall project including details of design, methods of trenching, and the unique pipe placement operation. At the option of the contractor, Healy-Tibbitts Construction Co. of San Francisco, the Prepakt method for placing concrete under water to encase the line was chosen in lieu of tremie concrete.

High strength and low cement

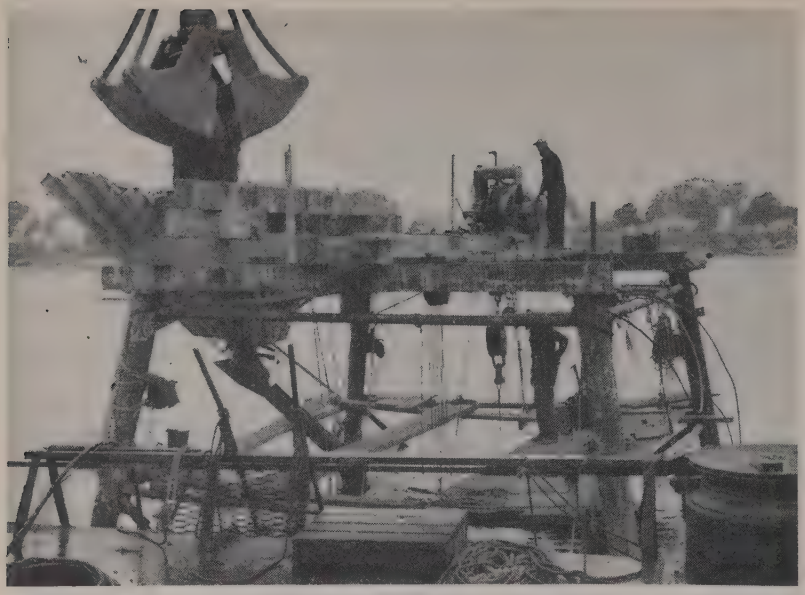
The portland cement used was Santa Cruz, Type 1. Sand was Felton, 97% passing a #16 sieve, which is finer than that used in conventional concrete. Mix proportions for the Intrusion mortar were 2:1:5 (cement; Alfesil; sand, by volume) plus Intrusion Aid and 15 gal. of ocean water. At 40% voids in the coarse aggregate, the portland cement content of the Prepakt concrete is approximately 3.3 sacks per cu. yd. Test cylinders made at the jobsite using this mix and job aggregate showed a compressive strength of 2,110 psi. at 28 days and 3,170 psi. at 90 days. Considering the low cement content and the use of ocean water, this is an excellent result.

After the trench had been excavated and its alignment and profile checked for bottom pinnacles and accurate grade, the precast pipe sections in 32-ft. lengths were lowered into approximate position by a derrick which next lifted the tower and placed it over the newly laid section. The pipe section was then picked up by winches on the tower and held in position while it was joined by divers to the previously laid conduit. After the connection was made, the new section remained suspended while the derrick clamshelled aggregate from a barge alongside and deposited it around the pipe through a hopper and chute supported on the tower. The chute from the hopper was handled by a diver who made sure that the pipe was fully encased with rock up to the top of the trench. Details of the pipe laying procedure were given in the **Western Construction** article previously mentioned.



Placing problems

The Intrusion mortar mixing and pumping plant was mounted on a 38 x 130 ft. barge and included two ½-cu. yd. skip-loading, Intrusion mortar mixers; a calibrated front-end Hough loader; two air-driven Intrusion mortar pumps; and a 2-in. centrifugal water supply pump. Also loaded on the plant barge was a stock of cement, Alfesil, Intrusion Aid, and sand. The mixing and pumping barge was accompanied by the crane barge which had done the trenching, pipe



PORTABLE TOWER supports 32-ft. pipe section in position as coarse aggregate is chuted into place around it. Placing 60% of the concrete in the inert state stabilized the newly laid pipe and greatly facilitated the pipe-laying phase of the work.

laying, and rock placement. This crane barge carried a compressor for air supply to the mortar pump and served as a base for the diving operations during the pumping. Materials supplies on the mixing barge were replenished either by transfer with the crane from a third barge or by return to the pier as conditions warranted.

Batching sequence was 30 gal. of water delivered from a water batcher mounted on the mixer; 4 sacks of cement, 2 sacks of Alfesil, and 5 lb. of Intrusion Aid which had been hand placed in the skip and were next fed to the mixer. The front end loader then delivered 10 cu. ft. of sand to the skip, the introduction of which to the mixer completed a ½-cu. yd. batch. After mixing, the grout dropped by gravity to a reserve agitating tank on the mixer and thence again by gravity to the grout pumps. Grout was delivered from each of the two grout pumps through a Y to two 1¼-in. grout hoses on the other end of which were 1¼-in. insert pipes 8 ft. in length.

Original plans were for one diver to place insert pipes in the aggregate by water jetting far enough in advance of the grouting so that the water stream would not interfere with freshly placed grout; the other diver would handle the grout inserts. During the first days' operations this was found to be impractical since the divers had to work singly and coupling and uncoupling 1¼-in. fittings under water was a difficult operation. This was quickly abandoned in favor of the method used for completion of the project.

The newly adopted method worked very satisfactorily and consisted of using grout as the jetting medium. This change permitted the four grout hoses to be permanently coupled to four insert pipes; not having to preplace pipes, the divers could work as a team; and since the intruded grout progressed up the trench on an approximately 1 on 5 slope, to place an insert pipe at 10-ft. intervals along the trench meant penetrating only 2 ft. of the crushed rock and the remaining penetration was through a grouted material where the rock was in a state of semi-suspension.

Leapfrogging grout inserts

Grouting was started at the offshore end of the line primarily because visability, such as there is in 40 ft. of water, was best at this point and secondly because the diffuser section at the offshore end required a second lift above the ocean floor. Inserts were placed at points opposite one another on each side of the 36-in. pipe. With four inserts operating they were then leapfrogged longitudinally at approximately 10-ft. intervals along the pipe line. Care was taken to assure that inserts were placed directly at all the pipe joints; i.e., every 32 ft. along the line. Divers determined when the grout had completely filled the voids and reached the top of the rock visually when possible or by feel as necessary. If a low point in the grout level existed at the midpoint between inserts the diver used his insert to bring the low point to the desired level before leapfrogging to the next position. Some variation in the grout level was to be expected since it would assume a 1 on 5 slope from the insert point. With inserts on 10-ft. centers longitudinally the variation could be 12 in. but by probing at the midpoint, this variation was reduced to 6-in. maximum. An excess quantity of rock had been placed as cover over the pipe to assure that at the low points the minimum coverage specified would be provided.

High mortar output

Maximum daily mortar output of the mixing and pumping plant was just over 2,800 cu. ft., sufficient for the consolidation and production of 250 to 260 cu. yd. of Prepakt concrete. Preplacing the coarse aggregate meant that approximately 60% of the concrete was placed in the inert state, greatly facilitating the difficult task of setting and initially stabilizing the pipe.

Personnel on this project for the city of Santa Cruz include R. N. Klein, city manager, and Alexander Russell, city engineer. Fred D. Bowlus was consulting engineer and Dan Boom was inspector. For the general contractor, Healy-Tibbitts, T. G. Anderson was vice-president in general charge and Norman Jennings was superintendent. Intrusion-Prepakt, Inc., was represented by Jack Kier, superintendent, and L. A. Gerdine, California regional manager.

What goes into Prepakt concrete?

Prepakt concrete is made by filling the voids in preplaced coarse aggregate with Intrusion mortar. The coarse aggregate for this type of work may range in size from a minimum of ¾ in. to any maximum size economically available and convenient to handle. The Intrusion mortar used to consolidate this aggregate consists of portland cement, Alfesil, Intrusion Aid, sand and water. Alfesil is the trade name for a finely divided pozzolanic material which reacts with the lime liberated by the portland cement during hydration to form an insoluble cementing material thereby reducing the quantity of portland cement required by increasing its efficiency while at the same time preventing the formation of the soluble hydroxides and carbonates which normally contribute to the weakening of concrete placed in salt water.

The Intrusion Aid is a patented admixture used in small proportions to produce a good quality concrete by the grouted aggregate procedure. This material makes the Intrusion mortar highly fluid at water-cementing materials ratios lower than normally required in conventional concrete. At the same time it imparts to the mortar the properties of a colloidal suspension and gives the mortar the ability to displace water without becoming diluted. The aid also delays initial stiffening of the mortar and eliminates setting shrinkage.

ROOF BEAMS, 66 ft. long, span one-half width of building and are spaced at 20-ft. centers. Rafters, 2x10, rest in joist hangers and have solid ⅝-in. plywood sheathing over.

ONE ROW of prestressed girders runs down centerline of shed on 40-ft. centers. Provision was made for doweling beams and girders to their supports. Columns and walls are precast units.

Building a transit shed for only $2.56 per sq. ft.

By JOACHIM E. LIEBMANN
Chief Engineer
Port of San Diego, California

WAREHOUSING of high quality, yet at surprisingly low cost, can be achieved through the use of modern construction methods. This is being demonstrated at the Port of San Diego where a transit shed, meeting the rigid requirements of the Cotton Warehouse Inspection Service, is nearing completion.

The new shed is 880 ft. long and 133 ft. wide with a minimum overhead clearance of 20 ft. It has three compartments separated by 12-in. concrete firewalls. Particularly noteworthy is the simplicity of the building which to a great extent accounts for its low cost and construction period of only four months.

The need for additional covered storage space arose from a huge increase in cotton shipments through this port during the past year. In view of limited funds, doubling the size of an existing metal shed on the Municipal "B" Street Pier was suggested at first. This, however, would have meant duplicating a rather outmoded facility. It was surprising to discover, after making preliminary studies and estimates, that for a relatively small added amount the obsolete metal shed could be removed and a larger modern structure built.

Pile foundations

All wall and column loads are pile supported. The north wall which faces shipside rests on the existing concrete piling of an apron wharf. Creosoted foundation piles were driven to support the remainder of the structure which is on an old hydraulic fill.

Concrete tilt-up walls

Precasting and tilt-up technique was applied to the 6-in. outside walls as well as to the 12-in. firewalls. Resurfacing of the present, somewhat irregular floor was excluded from the work. Consequently, the contractor was forced to construct a number of plywood casting platforms and "stack" the panels during his precasting operation.

Every alternate panel along the shipside (north side) has a large door opening. These door panels were cast integrally with a column along each side. The remaining solid panels on this side were attached to the precast wall columns by a number of inserted welding plates. The reinforcing steel of the bond beam near the top of the panels was made continuous by welding.

On the opposite side (south side of the building) the contractor preferred to cast the columns in place after precast wall panels were erected. In case of the firewalls, as an added precaution, all horizontal reinforcing bars were welded to those of adjacent panels.

Prestressed concrete beams and girders

Roof beams are 66 ft. long, which is one half the width of the building. Spanning the entire width would not have been as economical and would have resulted in excessive loads on the existing concrete piles of the apron wharf.

The roof beams are spaced on 20-ft. centers with one end resting on an

(Continued on page 48)

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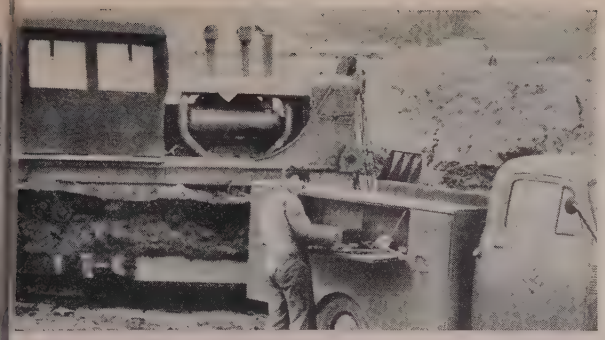

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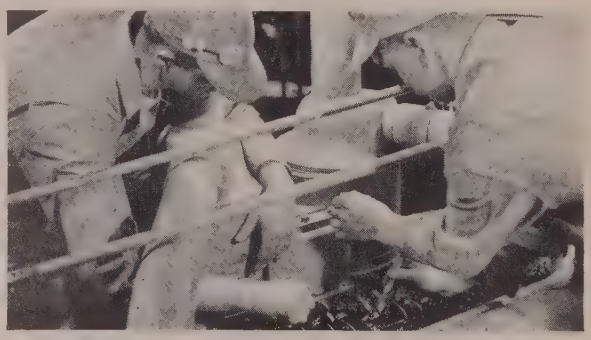

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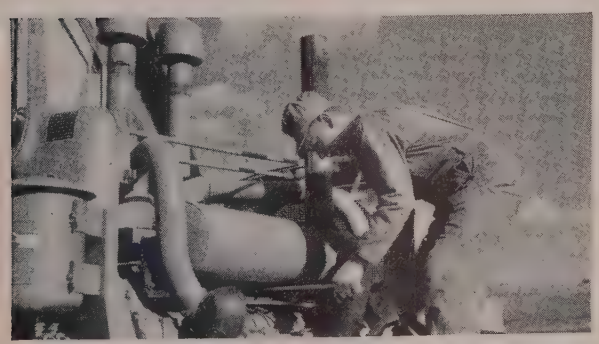

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Wood Tractor Company—Portland
UTAH
Cate Equipment Company, Inc.—Salt Lake City
WASHINGTON
A. H. Cox & Company— Seattle, Tacoma
American Machine Company—Spokane
Mid-State Equipment Company— Wenatchee, Wash.
WYOMING
Studer Tractor & Equipment Company—Casper

ALL 66-FT. prestressed roof girders were transported two at a time on lumber carriers from a casting yard 5 mi. distant from the job location. Good trick for getting around corners.

outside wall column and the other end on a carrying girder along the centerline of building. The carrying girder rests on precast concrete columns spaced on 40-ft. centers, except at both ends of the shed where the span was increased to 60 ft.

The roof beams as well as the carrying girders are of prestressed concrete. Although a pretensioning method was used, the design called for positive end anchorage. The Dorland end anchor was used, which consists of a special steel clamp 6 in. long that is stamped on to the wire with a heavy hydraulic press thus deforming it into a corrugated shape. High stress concentrations in the concrete at the ends of the beam were avoided by staggering the anchors. This also had the effect of varying the prestress within the member. Provisions were made for doweling the prestressed members to their supports. The connections are capable of transmitting shear but no moment. The 40-ft. girders and 66-ft. beams were erected without difficulty with a single truck crane. Two such cranes were used for the 60-ft. girders.

A number of beams were load-tested at the casting yard before they were shipped to the site. One of the 66-ft. tapered beams was damaged slightly after it was delivered. It was decided to return it to the yard and test it to destruction. Loads were applied at the critical sections, which occurred approximately at the one-third points for this particular tapered beam. Failure occurred when each of the two loads reached 27,600 lb. which is equivalent to the design dead load plus 3.2 times the uniform design live load. Failure had previously been predicted at dead load plus 3.4 times the live load. The point of failure was 10 ft. from one end of the beam. Vertical stirrups, although not necessary for design loads but desirable in view of high ultimate loads, had been placed in the first 10 ft. Shear failure occurred, therefore, just beyond the last stirrup.

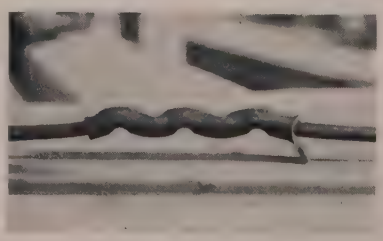
Plywood roof

Many types of roofs were considered. The wood roof, consisting of 2 x 10-in. rafters spaced on 2-ft. centers and ⅝-in. plywood sheathing, was chosen for two reasons. It was low in cost and, furthermore, could be designed as a diaphragm to transmit horizontal wind and seismic loads to the walls, particularly to the end walls and the two firewalls. Earthquake loads were based on a horizontal force factor of 0.133. Within 40 ft. of each end or firewall the shear in the roof exceeded the allowable that could be developed through the plywood diaphragm. At these locations X-bracing, consisting of 1¾-in. diameter steel rods, was installed.

Joists are attached to the roof beams by means of galvanized joist hangers. This gives the ceiling a finished appearance, still further improved by two spray coats of white paint. The plywood sheathing is covered with a 4-ply tar and gravel roofing with a bonded maintenance guarantee of 15 yr.

DESIGN DATA FOR TAPERED ROOF BEAMS

Concrete:	5,000 p.s.i.
Steel: 16 ⅜-in. diam. wires	
Ultimate stress	200,000 p.s.i.
Effective prestress	110,000 p.s.i.
Design Loads D.L. 400 lb. per sq. ft.	
L.L. 320 lb. per sq. ft.	



DORLAND END anchor provided positive end anchorage for pretensioned beams. Staggered anchors avoided stress concentration.

Fluorescent lighting

Skylights, monitors, and windows, usually an expensive item, were omitted except for small windows in the outside walls of the two stevedores' washrooms. They are undesirable in a roof diaphragm because they destroy its continuity and complicate construction.

Instead, plans called for a fluorescent lighting system, consisting of a 3-tube, 120-watt fixture per 530 sq. ft. of floor area. The resulting light is very uniform with a measured intensity of eight foot candles at floor level. Exterior lights over all doorways are also of the fluorescent type.

Appurtenant work

The shed has a complete fire protection sprinkler system and also in each compartment four handhose connections. Not included in the contract was the 8-in. looped water main under the apron wharf which had served former buildings on the site.

There are a total of 44 steel rolling doors. The firewall and end walls have 22 x 16-ft. doors, the one in the front face being motor operated. The two sets of double doors in the fire walls are automatically released by fusible links and also by a rate-of-rise heat actuated device. On the side facing the depressed track, doors are 12 x 12 ft., spaced at 44 and 56 ft. to accommodate railway box cars. Along the shipside every other panel has a 16 x 16-ft. door.

Offices are not included. However, the building was set back 30 ft. from the street line to permit future construction of an office building or pier headhouse, as it is commonly called. Two terrazzo-lined washrooms face the shipside of the pier.

Bids below estimate

As mentioned at the beginning, the structure was intended to replace an obsolete shed at a low cost. It is not elaborate, but because of its simplicity, quite striking in appearance. Even more remarkable is the low bid price of $299,600. This amounts to only $2.56 per sq. ft. and includes the new pile foundations, lighting, sprinkler system and all other appurtenant work. Not reflected in the bid price is the cost of the existing floor slab and concrete piles under the north wall. There were a total of eight bids, the highest being $399,810, which was still below the engineer's estimate of $400,000.

Specifications and basic design, which allowed several alternates particularly with respect to roof design and certain structural details, were prepared by the Port's engineering forces under the author's direction. Detailed structural design was by Thomas Atkinson and electrical design by Willis L. Lipscomb, both local consulting engineers. Robert J. Kallander was superintendent for the prime contractor, M. H. Golden Construction Co. of San Diego.

with 51 improvements!

The SEAMAN Self-Propelled TRAV-L-PLANT. 7 ft. mixing width. Gasoline or diesel powered. Equipped with pump, tachometer assemblies, volumetric meter and spray bar for application of bitumens or water.

PULVI-MIXER

SAVES MAINTENANCE DOLLARS. Stones or aggregates of any size when mortar-locked by the SEAMAN-process are highly immovable, consequently resist moisture penetration and the ensuing damaging effect of traffic. This is true whether the course be simple gravel stabilization or of a higher type employing any of the many available binders. A SEAMAN constructed base or sub-base stands without spring break-up, without raveling, washboarding or maintenance requirement.

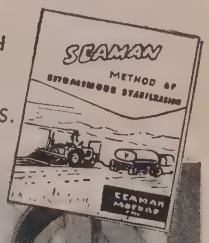
EARTH FILLS AND EARTH DAMS. Those same SEAMAN principles, — the elimination of voids, and the blending of soils produce densities in earthwork that range 95% to 100%. Very important is the inter-mixing of the various soil types found in fill material so that uniform reaction to moisture and compaction will result.

SEAMAN TRAV-L-PLANT in bituminous city street construction.

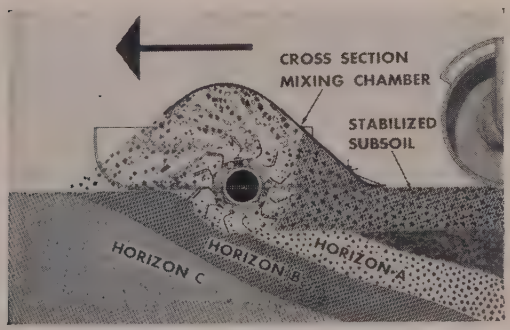
SEAMAN MOTORS, Inc.

285 North 25th St. • Milwaukee 3, Wis.

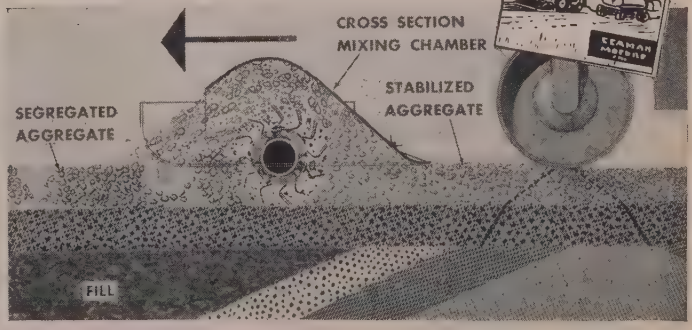
A description of the SEAMAN MIXER and the work it does is detailed in this recent BULLETIN. A postcard request will bring it to you — rush. Just ask for Bulletin TPS.



MIX STABILITY



Here the PULVI-MIXER stabilizes sub-base by blending soil horizons (A, B, C) to attain uniformity in moisture, density and thickness. This prevents sub-base failure.



Here the SEAMAN processes aggregate for the base, correcting by proper assembly of materials, an always-present segregated condition. The coarse material is keyed and interlocked, voids are filled with fines to securely mortar-in the larger aggregates.

UNIT PRICES

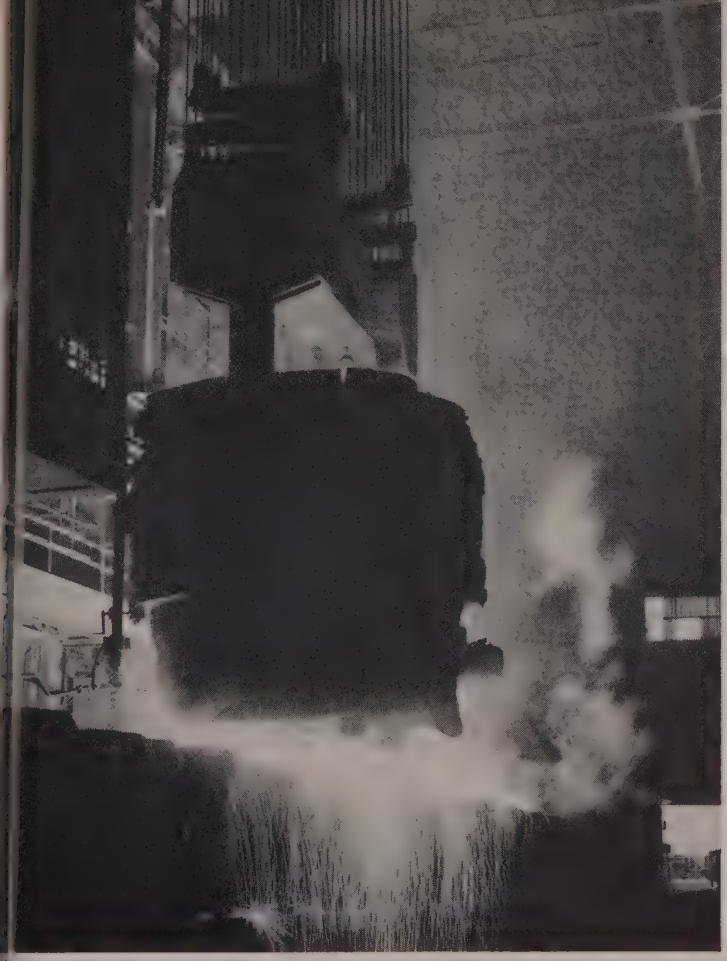
Selected abstracts for Western projects

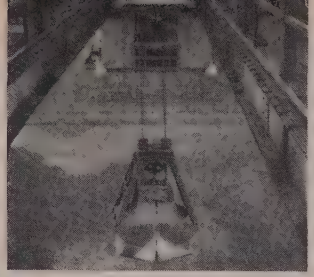
DAM—Glendo Dam in Wyoming

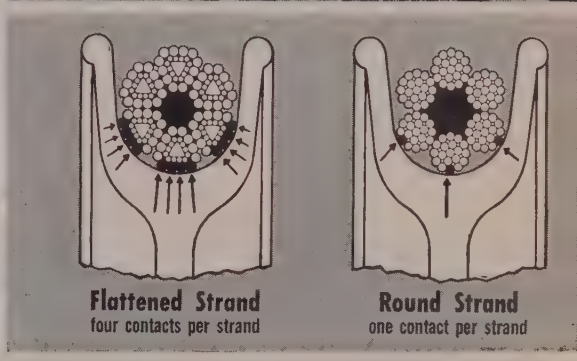
Wyoming—Missouri River Basin Project—Bureau of Reclamation. Lytle and Green of Sioux City, Iowa, submitted a low bid of $6,270,790 for construction of the Glendo Dam, power-plant foundation and roads.

(1) Lytle and Green	$6,270,790
(2) Grove Shepherd Wilson & Kruge, Inc.	6,296,136
H. N. Rodgers & Sons Co., and Clark-Farrell Co.	6,757,998
Guy F. Atkinson Co.	6,760,859
Winston Bros. Co.	6,762,104
Peter Kiewit Sons' Co.	6,958,855
Groves, Lundin & Cox, Inc.	6,980,502
Glendo Constructors	7,237,892
Teco Corp.	7,515,378
Utah Construction Co.	7,363,714
S. J. Groves & Sons Co. and Kenny Construction Co.	7,617,726
S. Birch & Sons Construction Co., McLaughlin, Inc. and N. A. Nelson Construction Co.	7,643,169
Jones-Tompkins	8,467,555
D & H Construction Co., Macco Corp. and M. H. Hasler Construction Co.	8,888,000
Morrison-Knudsen Co., Inc.	8,944,834

		(1)	(2)
Lump Sum	Diversion and care of the river during construction and removal of water from foundations	...	...
95,000 cu. yd.	Excva. for spill. first 95,000 cu.yds.	$ .62	$ .52
95,000 cu. yd.	Excav. for spill., over 95,000 cu. yds.	.42	.40
5,000 sq. yd.	Sprayed protective coating	.58	.65
5,210 sq. yd.	Concrete protective coating	2.20	.60
131,000 cu. yd	Excav. for dam embank. found, first 131,000 cu. yds.	.51	.28
131,000 cu. yd.	Excav. for dam embank. found., over 131,000 cu. yds.	.31	.22
1,200 cu. yd.	Excva. for grout cap up to 5 ft. depth.	9.35	8.00
300 cu. yd.	Excva. for grout cap between depths of 5 ft. and 8 ft.	10.30	10.00
43,400 cu. yd.	Excva for dike embank found.	.24	.19
200,000 cu. yd.	Excva. in opencut for outlet works and power plant, first 200,000 cu. yds.	.81	.80
200,000 cu. yd.	Excva. in opencut for outlet works and power plant, over 200,000 cu .yds.	.60	.60
40,600 cu. yd.	Excva. in outlet wrks. tunn. and shaft.	15 00	17.00
910,000 lb.	Furn. and placing permanent struct. steel ribs, steel lin. plates, and steel lagging	.21	.17
4,000 lin. ft.	Furnish. and install. tunn. roof supp. bolts	4.35	2.50
170,000 cu yd.	Excavation, stripping borrow pits	.18	.14
264,000 cu. yd.	Excva. in dike borrow area and transportation to dike embankment	.24	.24
1,327,000 cu. yd	Excva. in dam bor.area & trans. to dam embank., first 1,327,000 cu. yds.	.50	.38
1,327,000 cu. yd.	Excva. in dam bor. area & trans. to dam embank., over 1,327,000 cu. yds.	.328	.29
2,700 cu. yd.	Bedding for riprap	78	.65
220 cu. yd.	Selected surfacing	.95	2.50
25,500 cu. yd.	Backfill	.58	1.00
1,320,000 cu. yd.	Earth fill in dam & dike emb., zone 1.	.16	.15
4,000 cu. yd.	Special compaction of earth fill	4.70	3.00
1,307,000 cu. yd.	Snd., gr. & cobl. fill in dam & dike embankments, zone 2	.08	.09
5,300 cu. yd.	Spec. compac. of zone 2 material	2.42	1.80
136,000 cu. yd.	Misc. fill in dam embank., zone 3	.16	.22
172,000 cu. yd.	Fill in disp. zone and disp. area	.05	.07
86,300 cu. yd.	Procuring and placing riprap	2.70	2.60
15,900 lin. ft.	Drill. grout hls in stage between depth of 0 ft. and 30 ft.	2.50	2.35
3,800 lin. ft.	Drill. grout hls. in stage between depths of 30 ft. and 60 ft.	2.35	2.35
3.300 lin. ft.	Dril. grout hls. in stage between depths of 60 ft and 110 ft.	2.30	2.60
650 lin. ft.	Dril. grout hls in stage between depths of 110 ft. and 160 ft.	2.20	2.60
6,800 lb.	Furn. & pl pipe & fittgs. for grouting.	1.00	.90
680 hook-up	Hook-up to grout hls. and conn.	6.60	9.00
30,000 sack	Pressure grouting	1.20	1.75
710 lin. ft.	Furn. 4 in. dia. sewer pipe and constructing drains uncemented joints.	2.20	2.00
2,540 lin. ft.	Furn. 6 in. dia. sewer pipe and construc. drains with uncem. joints.	2.90	2.25
235 lin. ft	Furn. 8 in. dia. sewer pipe and construc. drains with uncem. joints.	3.60	3.00
1,800 cu. yd.	Pervious blanket	3.00	4.90
3,800 lin. ft.	Drill holes for anchor bars & grouting bars in place	1.00	.90
74,100 bbl.	Furnishing and handling cement	4.75	5.90
5,705,000 lb.	Furn. & placing reinf. bars and dowels.	.113	.13
670 cu. yd.	Concrete in grout cap	9.20	12.00
5,295 cu. yd.	Concrete in spillway walls	45.60	26.00
1,925 cu. yd.	Concrete in spillway floors	15.20	15.00
1,335 cu. yd.	Concrete in spillway crest structure	23.20	17.00
86 cu. yd.	Concrete in highway bridge	138.50	96.00
2,595 cu. yd.	Conc. in outlet-wrks. intake structure.	33.00	27.00
1,800 cu. yd.	Conc. in outlet-works conduit	31.40	22.00
10,200 cu. yd.	Conc. in outlet-works tunnel lining	28.20	35.00
1,620 cu. yd.	Conc. in outlet-works gate shaft	23 70	72.00
12 cu. yd.	Conc. in outlet-works shaft house	197.00	150.00
5,400 cu. yd.	Conc. in outlet-wrks. minu. anchor blk.	9.75	15.00
3,000 cu. yd.	Conc. in outlet-works stilling basin and in left tailrace wall	35.80	20.00
2,300 cu. yd.	Conc. in outlet-works, second stage	17.50	20.0
4,400 cu. yd.	First-stage conc. in pwr plnt, subst	16.00	13.00
2,900 cu. yd.	First-stage conc. in pwr. plt. inter. struc	52.50	22.00
300 cu. yd.	Backfill conc. about pwr. plnt. struct.	40	10.00
50 cu. yd.	Concrete in block-outs	105 00	200.00
52 cu. yd.	Concrete in gutters	57 00	52.00
4,850 lin. ft.	Furn. and placing metal waterstops	1.00	2.60
1,840 lin. ft.	Furn. and placing metal seals, type N1	1 10	1.40
3,000 lin. ft.	Furn. and placing metal seals, type N2	1 45	1.60
1,355 lin. ft.	Furn. and placing metal seals, type M2	2 20	2.00
1,210 lin. ft.	Placing type "B" rubber waterstops	1 10	1.40
300 lin. ft.	Placing type "D" rubber waterstops	1 40	1.40
800 lin. ft.	Placing type "F" rubber waterstops	1 80	1.40
700 sq. ft.	Furn. & pl 1 in corkbd. joint filler	1 15	.70
200 sq. yd.	Furn. & app. damp. 3 coat dprfig. comp.	2.50	.80
Lump Sum	Fur. & inst. met. louv. & stl. swg. door	.	.
150 sq. ft.	Furnishing and placing roofing	1 00	1 60
Lump Sum	Furn. & erec. prefab. hsng. for outlet-works control house	. .	. .
32 unit	Furn. & instl. surf. settlmnt. points on dam embankment	15 50	10.00
1,700,000 lb.	Install. tunnel liner, surge tank, penstock and outlet pipe	.15	.16
330,000 lb.	Installing outlet gates	.06	.09
143,000 lb.	Installing fixed-wheel gate	.04	.12
80,000 lb.	Installing fixed-wheel gate hoist	.06	.07
6,000 lb.	Instal. contr. equip. & piping for fixed-wheel gate hoist & outlet gates	.26	.45
51,000 lb.	Instal. seats, tracks & guides for fixed-wheel gate and for bulkhead gates	.09	.16
212,000 lb.	Instal. trashrack supp. and trashracks	.07	.06
12,000 lb.	Furn. & instal. embed. metal pipe & fitt. less than 6 ins. in diam	.15	.90
40,000 lb.	Furn. & instal. embedded metal pipe & fitt. 6 ins. & larger in diam	.50	.70
Lump Sum	Furn. & instl. draft-tube unwat. valv.	.	.
6,400 lb.	Furn. & instal. reserv. level gage well & piping	.80	1.50
3,000 lb.	Instal. stl. ladrs., pltforms, beams and handrails furnished by Gov	.52	.60
9,700 lb.	Instal. met. cov & gratgs. furn. by Gov	10	30
540 lin. ft.	Furn. and erect. chainlink fences	3.30	3.50
400 lb.	Furn. embedded metal frames	.56	.35
1,350 lb.	Installing embedded metal frames	.40	.40
22,200 lb.	Furninhing anchor bolts	.30	.18
26,000 lb.	Installing anchor bolts	.19	.35
4,800 lb.	Furn. & instal. misc. metalwork	.85	.90
3,000 lb.	Furn. & instal. grounding system	2.00	2.25
250 lin. ft.	Furn. & instal. embedded elec. rigid metal conduit ½ inch in diam	.70	.80
5,000 lin. ft.	Furn. & instal. embedded elec. rigid metal conduit ¾ inch in diam	.82	.90
1,250 lin. ft.	Furn & instal. embedded elec. rigid metal conduit 1 inch in diam	1.14	1.30
500 lin. ft.	Furn. & instal. embedded elec. rigid metal conduit 1¼ inches in diam	1.50	1.70
1,250 lin. ft.	Furn. & instal. embedded elec. rigid metal conduit 1½ inches in diam	1.60	1.90
1,100 lin. ft.	Furn. & instal. embedded elec. rigid metal conduit 2 inches in diam	2.00	2.30
500 lin. ft.	Furn. & instal. embedded elec. rigid metal conduit 2½ inches in diam	3.40	3.90
250 lin. ft.	Furn. & instal. embedded elec. rigid metal conduit 3 inches in diam	4.60	5.20
300 lin. ft.	Furn. & instal. exposed elec. rigid metal conduit ¾ inch in diam	1.00	1.00
200 lin. ft.	Furn. & instal. exposed elec. rigid metal conduit 1 inch in diam	1.30	1.50
1,100 lin. ft.	Furn. & instal. exposed elec. rigid metal conduit 1¼ inches in diam	1.40	1.50
50 lin. ft.	Furn. & instal. exposed elec. rigid metal conduit 1½ inches in diam	2.80	3.00
300 lin. ft.	Furn. & instal. exposed elec. metallic tubing ¾ inch in diam	.80	1.00
3,000 lin. ft	Furn. & instal. 1 cond. No. 12 AWG, 600 V. insulated elec. conductor	.12	.10
1,000 lin. ft.	Furn. & instal. 1 cond. No. 10 AWG, 600 V., insulating elec. conductor	.16	.20
500 lin. ft.	Furn. & instal. 1 cond. No. 6 AWG, 600 V., insulated elec. conductor	.34	.40
3,400 lin. ft.	Furn. & instal. 1 cond. No. 2 AWG, 600 V insulated elec. conductor	.75	.70
800 lin. ft.	Furn. & instal sgl. cond. No. 1/0 AWG, 600 V insul. induc. htg. elec. cond.	.95	1.00
Lump Sum	Instal htg. transf. fused safety swit' magnetic starter & thermostat for drain outlet heating	. .	. .
14 Fixture	Furn. & instal. lightg. fix., type "C"	25.00	28.00
2 fixture	Furn. & instl. lightg. fix., type "D"	35.00	40.00
1 fixture	Furn. & instl. lightg. fix., type "E"	45.00	50.00
60 lb.	Furn. & instal. service ent. switches	9.00	11.00
147,000 cu. yd.	Excavation, common, for roadway	.29	.60
20,900 cu. yd.	Excavation, rock, for roadway	1.35	1.40
3,000 M gal.	Watering for roadway	4.00	3.90
500 roller hr.	Rolling embankments for roadway	10.00	15.00
375,000 sta. cu. yd.	Overhaul of excavation for roadway	.02	.01
12,000 cu. yd.	Gravel surfacing for roadway	2.70	2.00
210 cu. yd.	Excavation, common, for culverts	3.60	3.00
45 cu. yd.	Excavation, rock, for culverts	10.00	1.00
880 cu. yd.	Backfill for culverts	.70	3.00
880 cu. yd.	Compacting backfill for culverts	3.00	2.00
50 cu. yd.	Riprap for roadway	5.00	8.00
110 lin. ft.	Furn. & lay, 18 in. dia., No. 16 ga. bit. coated, corr.-metal pipe	4.60	5.00
490 lin. ft.	Furn. & lay. 18 in. dia., No. 16 ga. corr. metal pipe	5.60	5.00
320 lin. ft.	Furn. & lay. 24 in. dia., No. 14 ga. corr. metal pipe	6.30	8.00
116 lin. ft.	Furn. & lay. 30 in. dia., No. 12 ga. corr. metal pipe	11.00	11.00
83 lin. ft.	Furn. & lay. 36 in. dia., No. 12 ga. corr. metal pipe	13.00	14.00
2 inlet	Furn. & instal. pipe drop inlets for 18 inch diam. corr. metal pipe	70.00	75.00
8 inlet	Furn. & instal. pipe drop inlets for 24 inch diam. corr. metal pipe	100.00	125.00
2,380 lin. ft.	Furn. and erec. beam-type guardrail	3.10	3.00
900 lin. ft.	Furn. and erec. wire-cable guard fence	2.90	3.50
276 post	Furn. and instal. guard posts	6.50	10.00
1,400 lin. ft	Furn. and constructing snow fence	.75	1.50
5 guard	Furn. and constructing cattle guard	1,540.00	1,600.00







How to handle the tough jobs with Hercules Flattened Strand wire rope

When you think you need a super-rope, check Hercules Flattened Strand. This is the wire rope that packs in 10% more steel than round strand rope, making it 10% stronger and safer. It wears longer and more evenly—reduces sheave wear, too.

The 10% extra strength over round strand rope is sometimes the difference between the possible and the impossible. Hercules Flattened Strand frequently does the tough jobs which would otherwise require larger size rope—and without the bother and expense of changing sheaves and drums. The extra strength is useful, too, when shock loading is involved. Saves rope and money.

If you think that Hercules Flattened Strand wire rope may solve a problem, talk it over first with your Leschen man. He can be reached through your nearby Leschen distributor. His advice is based on the best possible authority—Leschen's long experience and engineering research—the longest in the industry. And with Leschen wire rope you are assured of higher-than-rated quality and longer-than-expected service.

If you can use Hercules Flattened Strand rope you'll be money ahead. See about it soon.

LESCHEN

HERCULES *Red-Strand*® **WIRE ROPE**

LESCHEN WIRE ROPE

Depend on Leschen's higher-than-rated quality for longer-than-expected service.

LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri

A DIVISION OF H. K. PORTER COMPANY, INC. HKP

WESTERN CONSTRUCTION NEWS

ARIZONA

A BID CALL can be expected in February or March from the Bureau of Reclamation for additional work on the Gila Project. The job will call for constructing 20 mi. of 125- to 15-cfs. capacity concrete-lined canal and laterals including 2 relief pumping plants of 125- and 70-cfs. capacities, checks, siphons, and turnout structures, and constructing 9 mi. of floodway dikes and channels including floodway drop structure. This will be for Texas Hill Distributing System, 50 mi. east of Yuma.

HERE ARE SOME of the major new contracts to be let by the Arizona Highway Department in 1955 by route, location, budget amount, and type of construction: U.S. 66, Apache County line to McCarrol Ranch, $1,200,000, reconstruction and new alignment (23 mi.). U.S. 80, Gila Bend-Buckeye, $1,400,000, additional projects on new alignment. State 69, Grand Avenue Interchange, $600,000, underpass at junction U.S. 60 and State 69. State 69, Cordes Junction to Mayer, $750,000, 8 mi. of new alignment. State 77, Christmas to Lynch Ranch, $500,000, additional grading on new alignment and pave 10 mi. U.S. 80 east of Tucson near Mountain View, $650,000, reconstruction of 8 mi. U.S. 60, Ash Fork west, $450,000, new overpass and 5 mi. of reconstruction.

PROVIDING RESIDENTIAL development for families of men stationed or employed at Fort Huachuca, the U.S. Army's permanent electronic proving ground, adds up to big construction. Only 75 days after ground was broken, 144 houses were completed as of last January 15. The Del Monte Construction Co. is creating a planned community here of 700 homes and related civic buildings. Price range of the homes on the 200-acre tract is from $7,000 to $12,000.

RECENT MAJOR CONTRACT AWARDS and low bids in Arizona include a low bid of $151,949 submitted by **B. L. Gustafson** of Phoenix for 1½ mi. grading, draining, pipelines, and curb and gutter in Mesa. **Ernest C. Mohamed** of Phoenix submitted a low bid of $356,839 for 2 mi. of grading and draining near Phoenix. **Morrison-Knudsen Co., Inc.,** of Los Angeles submitted a low bid of $634,476 for earthwork and structures on Unit 4, Welton-Mohawk Division of the Gila Project. **Rodgers Construction Co.** of San Diego submitted a low bid of $309,388 for 3.3 mi. grading and paving on the Verde Valley-Roosevelt Dam road in Gila County. **United Contractors, Inc.,** of Glendale, Ariz., submitted a low bid of $356,500 for 14 2/3 mi. grading and draining a new alignment of US 80 near Buckeye. **Wallace & Wallace** of Phoenix submitted a low bid of $395,555 for 8.5 mi. grading, draining, subgrade seal and base on SR 73 east of McNary.

BIG COPPER DEVELOPMENT IN ARIZONA

Utah Construction Co. and Stearns-Rogers Manufacturing Co. are joint venturers on construction of a $120,000,000 railroad, mill, and smelter for the San Manuel Copper Corp. located 45 mi. north of Tucson. Shown here is some of the major work required on the railroad. For a fuller description of the project and the names of the key men working there, turn to page 78 of the SUPERVISING section, this issue.

CALIFORNIA

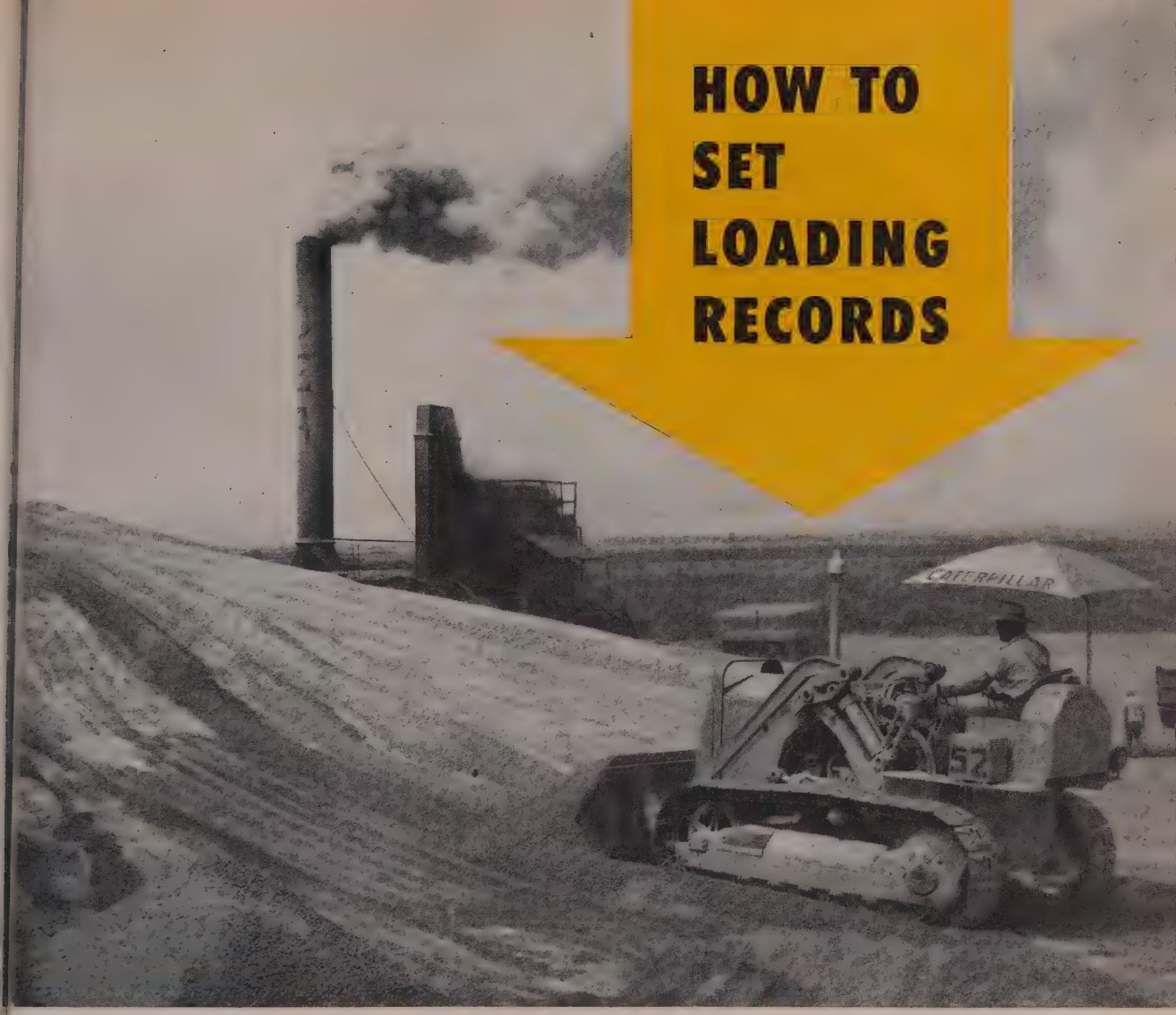
EARTHQUAKE AT NOON on December 21 startled Christmas shoppers in Eureka, Humboldt County, bringing widespread minor damage and a few cases of major structural failure. One fatality resulted, but only indirectly.

Plate glass was shattered, plaster fell, showcases in stores and furniture in houses were upset. There were minor failures in the surfaces of nearby highways.

The biggest threat to Eureka citizens was loss of water supply. A municipal reservoir and its transmission pipeline sprang leaks. These were repaired within days before any serious shortage was suffered.

Two buildings inspected by Harold Hammill, consulting engineer of San Francisco, were the county courthouse and the city hall. The city hall is a two-story structure of brick bearing walls and wood floors. Like other buildings of its type in previous quakes, "it didn't fare too well," according to Hammill. It has been

HOW TO SET LOADING RECORDS



THIS Caterpillar HT4 Shovel feeds a 1500-lb. hot batch asphalt plant and loads trucks for Ideal Asphalt Paving Co., Inc., near Las Vegas, Nev. Plant production averages 500 tons per eight-hour day. This HT4 has loaded as much as 1300 tons of gravel in the same period of time!

The versatile CAT* HT4 Shovel can earn its keep at many tasks: bulk material handling, grading, excavating, light bulldozing, cleaning up. It's compact and maneuverable for work in tight places. Hydraulic controls are precise and fast-acting, and permit simultaneous raising and dumping of the 1¼-yd. bucket. Because it's designed as a unit, with the weight of the bucket evenly distributed along the full length of the tracks, it will not "dance," even with a full load.

Rugged construction is an important reason for the HT4's high work output. It's built to withstand extreme stresses and stay on the job year after year without costly down time. Carefully designed filters and seals protect the machine's Caterpillar-built precision. They keep oil and lubricants *in*, and harmful grit *out* of the engine and hydraulic system.

Ideal Asphalt is predominantly equipped with Caterpillar-built machines. They own two HT4 Shovels, a D7 and two big D8 Tractors, and three Caterpillar Diesel Engines. "We think we can make more money with the big yellow machines," says Mark C. Whiting, company treasurer. "They're dependable, and we can get parts and service when we need them. Our dealer service is the way we like it."

Your Caterpillar Dealer can give *you* the same kind of service. Ask him for black and white *proof* that the Caterpillar HT4 Shovel will do *more* work at *less* cost on *your* job than any other shovel of its size.

Caterpillar Tractor Co., San Leandro, Calif.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

WELDING HAS LARGE ROLE IN BAY BRIDGE APPROACH CONSTRUCTION
Over 11,000,000 lb. of steel, welded into girders, beams, and stringers are going into the $4,200,000 San Francisco-Oakland Bay Bridge east approach. On this project, the largest to utilize this method, MacDonald, Young & Nelson and Morrison-Knudsen are joint venturers. Girders were fabricated by Union Steel Co. from plate supplied by Kaiser Steel. Erection was by Independent Iron Works.

closed, with condemnation probably to follow.

The three-story courthouse had been surveyed by Hammill eight years ago, in 1946, and a tower portion and parapets removed at that time on recommendation. In the recent earthquake, damage on the first two floors was not extensive, except for cracking. The structure is tied by masonry arches and steel beams.

The third floor walls, however, support a roof having no diaphragm action at all. Virtually free standing, one wall was observed by Hammill to have opened up along about 30 ft. of a total 60-ft. length, with displacement of as much as 6 in. A little more motion would have brought the roof in. This building has also been closed.

Experience of school buildings exposed to the quake provides a good check on principles of lateral force design. Six high school and ten elementary buildings in Eureka were undamaged. State law in California, enacted after the 1933 earthquake at Long Beach, requires supervision of all school design by the State Division of Architecture. Eureka schools built earlier than 1933 were reported to have been damaged, but the extent is not yet completely known.

FINANCING CONSTRUCTION for the lower deck of the new Richmond-San Rafael bridge remains unsolved. Governor Knight had hoped to find funds for the purpose but has announced his inability to do so. Although contractors' bids for work on the 4-mi. structure have been 10% below estimates, the savings of about $4,000,000 would not be enough to build the lower deck. It is deemed unwise at the present time to seek legislation to divert highway construction money to the toll bridge. One procedure might be to sell the remainder of the authorized bond issue of $72,000,000, of which only $62,000,000 was sold initially.

A PROGRESS REPORT on the $1,000,000,000 Feather River Project is being presented to the State Legislature this January. A detailed report will be turned out in June. Although no funds have been appropriated for construction, a tentative construction schedule would provide these amounts: Oroville dam, $15,000,000; purchase of lands and improvements which would be flooded when the Oroville dam is built, $28,000,000; relocation of highways and utility lines, $27,000,000; San Luis Creek to Wheeler Bridge canal and pumping system on west side of San Joaquin Valley, $48,000,000; San Luis reservoir and forebay, $12,000,000.

The schedule would enable water to be delivered to the lower San Joaquin Valley beginning in 1959, but not until 1977 would Southern California get any. Completion of the entire project would be in 1987.

CALIFORNIA STATE DIVISION of Architecture will place under construction in 1955 $36,000,000 in Northern California and $32,000,000 in Southern California. Large projects will include in Sacramento a Department of Public Works headquarters laboratory building—$1,381,800; Department of Veterans Affairs office building—$2,281,000; at Vacaville, Solano County, the California medical facility—$3,695,500, for auditorium, library, and chapel—$1,516,000. Stockton will receive a new Department of Public Works District office building—$1,080,000.

CONTRACTS were to be let soon for an estimated $1,973,000 worth of water diversion lines into Pleasant Valley, Oxnard, and Port Hueneme as announced by directors of the United Water Conservation District. The lines will be serviced by water from behind Santa Felicia Dam on Piru Creek when the dam is finished in the winter of 1955.

A $60,000,000 SEWER bond issue will appear before the Los Angeles voters at the April 5 municipal primary election. This money will be used to construct a new submarine outfall system at Hyperion extending 6 mi. or more into the ocean. Purpose of the construction is to lower sewage treatment costs and at the same time reduce water pollution in Santa Monica Bay. Of the total amount, $40,000,000 will be earmarked for the outfall, and $20,000,000 will be earmarked for construction of additional lateral sewage collection lines to connect the city's many far flung new subdivisions. Los Angeles voters will also vote at the April 5 ballot on a $133,000,000 school bond issue. This will appear as three separate propositions providing for elementary, secondary, and junior colleges. Money will be used to construct 2,476 new classrooms, enough to accommodate 85,000 students.

GIVEN MANUFACTURING CO. of Los Angeles is having a technical appraisal made of its plan to control the Los Angeles smog problem. The proposed solution is a 43-mi. concrete pipeline, 20 ft. in diameter, which would carry all industrial and combustion fumes to smokestacks reaching above the inversion layer at the mountains. Estimated cost of the system is $200,000,000 to $300,000,000 over several years construction time.

WORK ON the $3,050,000 Fourth Street cut through Bunker Hill in Los Angeles has passed the 20% completion mark. When the work is completed by Webb & White, a half-mile long thoroughfare will be provided for one-way, eastbound traffic connecting the Harbor Freeway and the west with Hill Street and the

RECENT MAJOR CONTRACT AWARDS and low bids in California include a low bid of $1,576,913 submitted by **Baldwin Contracting Co., Inc.**, of Marysville for 13.1 mi. grading and plant-mixed surfacing near Roseville. **Gordon H. Ball & San Ramon Valley Land Co.** of Berkeley submitted a low bid of $1,908,844 for 4 mi. grading and paving and construction of six bridges in Kern and Tulare counties. **L. E. Dixon Co.** of San Gabriel received a $4,238,193 award for construction of cement

High-quality, low-cost

WELDED STEEL PIPE

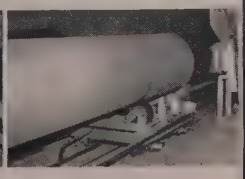
for more efficient water supply lines

When planning your next permanent water supply project, be sure to consider the quality and money-saving features of American's welded steel pipe. Many cities throughout the Northwest have found it to be the answer to their problems.

Manufactured to buyer's specifications in accordance with A.W.W.A. standards, it is available in 12″ to 144″ diameters in nominal lengths of 40 feet with plate thicknesses ranging from 3/16″ to 1½″. Coal tar enamel lining and coating (asbestos felt wrapping where required) protects against corrosion. The pipe is fabricated with one longitudinal tension seam only on *all* diameters. Longitudinal and girth seams are automatically welded.

This outstanding pipe can be advantageous to you in initial economy and trouble-free performance. We'd like to plan with you on your next project . . . our services include both manufacture and installation where desired. Call us for estimates and further information.

Automatic welding



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plant at Mojave. **Fred J. Early Jr. Co., Inc.**, of San Francisco submitted a low bid of $1,236,765 for construction of a riveted steel plate girder bridge and approach embankment over the Colorado River at Yuma. **R. A. Erwin** of Colton submitted a low bid of $215,896 for 40 mi. of seal coating near San Bernardino.

Fredrickson Bros. of Emeryville submitted a low bid of $579,796 for 2.1 mi. of grading and plant-mix surfacing in Mendocino County. **Fredrickson & Watson Construction Co.** of Oakland submitted a low bid of $785,555 for 2.9 mi. of grading and surfacing between Mountain Gate and Bass Hill in Shasta County. **Griffith Co.** of Los Angeles submitted a low bid of $160,859 for 2.3 mi. grading and paving near Taft.

R. E. Hazard Contracting Co. & W. F. Maxwell of San Diego submitted a low bid of $349,760 for construction of a reinforced concrete bridge and traffic interchange at Camp Pendleton entrance, San Diego County. **C. V. Kenworthy** of Stockton submitted a low bid of $237,958 for 7.6 mi. grading and surfacing in Inyo County.

COLORADO

DENVER—Construction is now under way on the long awaited 20-story skyscraper hotel and a 7-story department store to be built by Webb and Knapp, Inc. This project located at Court House Square, pending since 1951, will have some excavation going to bedrock at 65 ft. below street level. Two other buildings being erected by Webb and Knapp, Inc., owners, and the George A. Fuller Construction Co., contractors, are the $1,000,000 transportation building and the $1,000,000 United States National Bank building. Both these buildings should be completed by April 1.

CONSTRUCTION on the Breed four-lane underpass north of Colorado Springs has passed the 75% completion mark. The $353,000 contract held by L. H. Kilgroe of Denver is designed to eliminate a dangerous railroad crossing and to aid rerouting of 3 mi. of highway to bypass Air Academy activity.

A NEW COST ESTIMATE of $157,000,000 instead of $173,000,000 has been set on the Frying Pan-Arkansas water diversion project near Pueblo. The new lower figure results from lower estimated construction costs and will aid passage of a bill authorizing this project in the 84th Congress.

APPROVAL by Governor Thornton of the State Highway Department's supplemental budget of $3,000,000 will enable construction of these projects: $985,000 for grading, structures and paving on the Monument-Larkspur section in Douglas and El Paso counties; $300,000 for stabilization and paving east of Limon on U.S. 24; $350,000 for purchase of right-of-way south of Colorado Springs on U.S. 85-87; $460,000 for construction of bridges on U.S. 85 south of Evans in Weld County.

CITY MANAGER A. J. Vasilakis of Farmington announces that Boettcher & Company and Associates of Denver will finance the city's $3,000,000 sewer, water line, and electrical facilities expansion program. Bids will be sought as soon as practical in the spring for this work.

THE FIRST CATSKINNER

W. K. Cox **(left) of Caterpillar Tractor Co. presents** ***Paul E. Weston*** **with suitable engraved model of a modern crawler tractor in celebration of Caterpillar's 50 Years on Tracks. Weston was an employee of the Holt Manufacturing Co. in 1904 and operated the first track-type tractor in tests near Stockton, Calif.**

RECENT MAJOR CONTRACT AWARDS and low bids in Colorado include a low bid of $243,965 submitted by **H. W. Pride** of Denver for rehabilitating buildings and grounds for the temporary Air Force Academy at Lowry Air Force Base.

IDAHO

PILE DRIVING OPERATIONS on the Sand Point Bridge over Lake Pend Oreille are closed down for the winter but work is continuing on blasting of quarry rock to be used in riprapping the approach. Of the 405,000 cu. yd. of fill, about 250,000 had been placed at the year's end. Dredging operations that provided this fill found good material within easy pumping distance of the site, and now that the lake water level is receding, the approach is coming into sight. The prime contract is held by Peter Kiewit Sons' Co. and LeBoeuf-Dougherty.

FLOW OF THE BOISE River at Lucky Peak dam, 10 mi. east of Boise, was being blocked off until possibly February 15 to allow completion of the penstock construction from the tunnels beneath the dam to the manifold building. The manifold building contains the gates which will control water flow from the dam. Contractors on this project are Russ Mitchell, Inc., and Bruce Construction Co., both of Texas.

MORE DRILLING is proceeding on a new site above the proposed Guffy dam on the Snake River above Marsing to determine the feasibility of a Bureau of Reclamation project for a 100-ft. high dam that would store water for irrigation of 110,000 acres near there. Drilling at the original Guffy dam site had shown an inadequate foundation.

RECENT MAJOR CONTRACT AWARDS and low bids in Idaho include a low bid of $476,568 submitted by **Gem Construction Co.** of Wendell for 5.1 mi. of grading and surfacing and construction of eight bridges on SH 46 near Camas. **Carl E. Nelson** of Logan submitted a low bid of $155,526 for construction of a railroad underpass and roadwork in Bannock County.

MONTANA

BIDS WILL BE open about the middle of February at Billings for grading, drainage, and paving of a new 150 x 600-ft. instrument landing runway. Plans are available at the office of the City Engineer.

MONTANA FACES a tough fight in

"We get Speedi-Service on Yellow Strand!"

Reports C. A. Powley
C. A. POWLEY CO.

When you're rushing to beat a completion date or trying to keep materials moving on schedule, prompt and accurate attention to your wire rope needs is a "must"! Machines must be kept working for maximum production and profits.

That's why veteran construction men . . . men like C. A. Powley, excavating contractor, sand and gravel producer and crane service owner . . . endorse the immediate Speedi-Service of their Broderick & Bascom distributor.

Powley's many machines are working on scattered jobs throughout Central Illinois. When a wire rope needs replacement, it's needed *right now* and Powley reports, "We get Speedi-Service from our Yellow Strand distributor . . . and excellent service out of the rope itself!" Most of Powley's machines are equipped with Yellow Strand.

You can count on wire rope, when you need it and where you need it, from your Yellow Strand distributor and you can count on the kind of performance that produces extra profits from Yellow Strand Wire Rope. Give it a try!

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One of C. A. Powley Co.'s Yellow Strand-equipped cranes hoists material into position on a church building project. Powley uses cranes, shovels, draglines, scrapers, dozers, loaders, motor graders and other equipment in the company's material production, grading, excavating and hoisting operations.

SPECIFY . . .

Yellow Strand

FOR SAVINGS . . . SAFETY . . . SPEEDI-SERVICE

providing enough money for all that the State departments and other divisions have requested for the next 2 yr. Anticipated State income from all sources will be $38,000,000 while the request alone for public schools and for higher education total $27,000,000—equivalent to two-thirds of all estimated general fund revenue.

BID CALLS can be expected in February and March from the Bureau of Reclamation for construction of the Helena Valley Tunnel. This project consists of 2.6 mi. of concrete line gravity tunnel with a proposed diameter of 7 ft.

BOND MONEY approved last November has been put to work by the Montana Board of Education in retaining architects for $1,500,000 of additions to the state training school in Boulder. J. G. Link & Co. of Butte has been retained.

RECENT MAJOR CONTRACT AWARDS and low bids in Montana include a $147,510 award to **F. L. Flynn & Co.** of Billings for construction of a 374-ft. steel and concrete bridge in Ravalli County. **McLaughlin, Inc.,** of Great Falls received a $236,488 award for 8.7 mi. grading and surfacing on the Jackson-Dillon road in Beaverhead County. **Nilson-Smith Construction Co.** of Great Falls received a $360,243 award for 7.3 mi. grading and surfacing on the White Sulphur Springs-Harlowton road in Meagher County. **Summit Construction Co.** of Rapid City received a $337,743 award for 10.8 mi. grading and surfacing on the Broadus-Wyoming line road in Carter County.

NEVADA

ONE OF THE MOST important earthquakes ever recorded in the United States occurred in the Dixie Valley, 110 mi. east of Reno in west central Nevada. Prof. David Slemmons of the University of Nevada discovered three new faults, one of which caused a vertical shift where one side was 20 ft. lower than the other. No construction projects were located in this sparsely settled area.

DIRECTORS OF THE Walker River Irrigation District have announced the determination of a location for a proposed new dam above the Hoye bridge in Antelope Valley. A bond election to authorize funds will not be set until Congress makes disposition of proposed small projects legislation pending before it.

NEW MEXICO

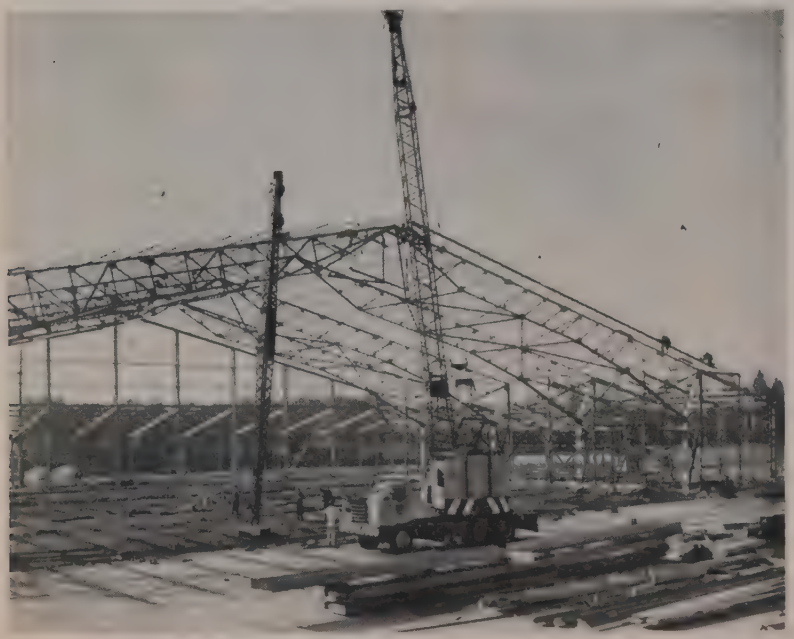
COSTS AND TRENDS in highway construction are presented in a new booklet issued by the State Highway Department. Printed at a cost of $1,694, the booklet will be sent to all city and county officials, educational departments, and members of the state legislature. New Mexico's present highway situation is presented, along with the anticipated needs, with detailed cost breakdowns.

A $1,890,000 HOUSING project is under way at Albuquerque. About 140 houses will be built on a 35-acre tract by the developer, Kenneth E. Ashcraft. Work has been going on for three months on water and sewer lines and construction of curb and gutter.

CONSTRUCTION OF FLASH flood control works by the Sandia Conservancy District is still at least 2 yr. away. Congress has already authorized the $10,000,000 project for the Corps of Engineers. However, the district itself must construct an estimated $3,000,000 of this amount for ditches, storm sewers, and other structures to carry flood waters into the Corps' big canals. Area covered by the district includes practically all of Bernalillo County from the Rio Grande east to the mountains.

About 5,000 construction workers suffered reportable accidents during the fiscal year 1953-1954, according to the annual report of the State Labor Commissioner. Total medical costs on workman's compensation cases handled rose to $132,000 compared to $68,000 the previous year.

RECENT MAJOR CONTRACT AWARDS and low bids in New Mexico include a $163,422 award to **Armstrong & Armstrong** of Roswell for 1.7 mi. grading and surfacing in Dona Ana County and another award of $107,979 for 0.9 mi. grading and surfacing on US 70 near Roswell in Chaves County. **Brown Contracting Co.** of Albuquerque received a $306,623 award for 6.5 mi. grading and surfacing SR 422 on the Albuquerque-Algodones road in Bernalillo County. **Floyd Haake** of Santa Fe received a $167,454 award for 3 mi. grading and surfacing of US 66 on the Gallup-Shiprock road in McKinley County. **Lembke-Clough & King** of Albuquerque submitted a low bid of $371,695 for construction of a 4-story hospital in Carlsbad. **George Rutherford** of Albuquerque submitted a low bid of $647,000 for construction of a high school at Grants. **J. H. Ryan & Son, Inc.,** of Albuquerque received a $206,832 award for 0.4 mi. grading and surfacing at Carlsbad; also $274,876 for work on U.S. 85 in Sandoval County.



LARGE HANGAR FINISHED AT McCHORD A.F.B.

Erection of the steel framework for this new hangar near Tacoma has been completed by Bethlehem Pacific's steel workers. General contractor on the 22,000-sq. ft. structure is John H. Sellen Construction Co. of Seattle.

OREGON

BID CALLS can be expected this summer for a new $400,000 to $500,000 bridge at Nyssa over the Snake River. In December the present bridge, which has three 170 ft. spans, was put out of order when one of the spans collapsed under the weight of an empty logging truck. Cost of the project will be split equally between Idaho and Oregon. The new structure will be either reinforced concrete or steel.

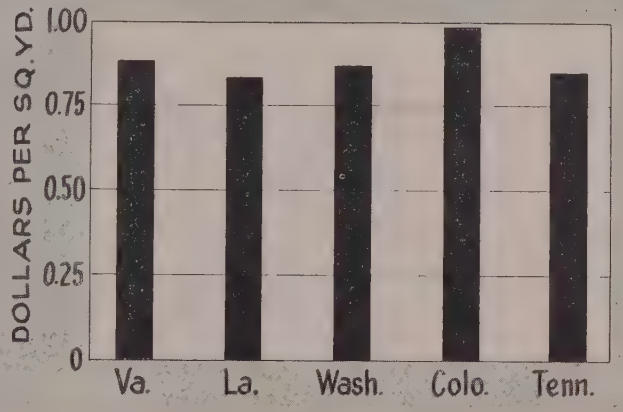
GENERAL SLOWING DOWN of major project construction and sea-

Soil Cement Is Low Cost for Road Base Course

Only 80-90c Sq. Yd!

Base materials native to the job can be used in many states. Even with imported materials, soil cement base course costs are lower in the long run. In the last 13 years soil cement paving awards increased from 9 million to 140 million square yards... that's a 1,555% increase!

AVERAGE SOIL CEMENT BID PRICES ROAD BASE COURSE—1953



TAKES HUGE LOAD!

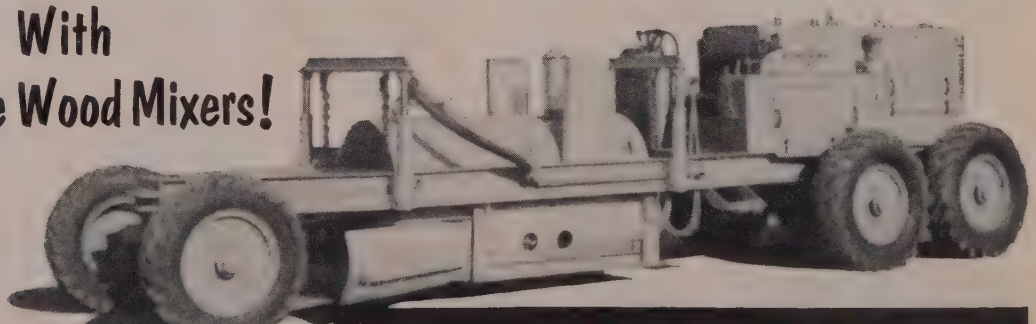
These various combinations of surface materials placed over soil cement base course show the tremendous load bearing value. As in airport construction, load bearing value is an extremely important factor in long life for roads and streets. It will pay to investigate!

Write for Case History File...Today!

AIRPORT LOAD-BEARING DATA WITH SOIL CEMENT BASE COURSE

BASE COURSE TYPE	BEARING VALUE K
6" Soil Cement 8" Compacted Gravel	535 355
6" Soil Cement 5½" Macadam + 2" Bituminous Surface	1012 626
6" Soil Cement + 2" Bituminous Surface 6" Emul. Stab. + 2" Bituminous seal	475 240
6" Soil Cement 6" Sand-Clay + Bituminous seal	735 520
6" Soil Cement 8" Sand-Clay + Bituminous seal	940 520
6" Soil Cement + Bituminous seal 8" Bituminous Stab. + 2" Bituminous Surface	424 255

Most Soil Cement Is Mixed With Pettibone Wood Mixers!



Model 42 Roadmixer Illustrated—Single Pass, Self Propelled; Model 54, Single Pass, Tractor Drawn and Powered also Available. Capacities up to 350 tons per hour.

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sonal lay-off combined to bring the construction employment at The Dalles dam and associated railroad and highway projects to around 2,000 at the turn of the year. Offsetting this in the spring will be the required increase of workers for 14 mi. of track work and new phases of development on the dam.

FOR THE SECOND TIME all bids have been rejected on equipment for the hydroelectric plant at The Dalles dam. In both cases foreign firms have been the low bidders. Early in 1954, a Japanese company's bid was rejected on generating equipment. The bid recently rejected by the Army was a bid submitted by a German manufacturer at $102,000 for a 30-ton crane. Reason for the rejection was given that re-examination of the specifications showed them to contain ambiguities and requirements which made full compliance difficult and uneconomic.

BID CALLS should soon be coming for construction of new approaches to the Hawthorne bridge at Portland to take care of the heavy traffic load while the new Morrison bridge is under way. This action is under the County Commissioners who estimate the cost of construction of approaches and of obtaining rights-of-way at $1,800,000.

RECENT MAJOR CONTRACT AWARDS and low bids in Oregon include a low bid of $395,196 submitted by **Guntert & Zimmerman Construction, Inc.**, of Stockton for construction of draft tube stoplogs and lifting beams at The Dalles Dam Powerhouse. **Lord Bros.** of Portland received a $129,030 award for construction of a 312-ft. viaduct and a 220-ft. pedestrian overcrossing in Multnomah County. **C. J. Montag & Sons, Inc., Carl M. Halvorson, Inc., Cascade Contractors, Inc.,** and **Austin Construction Co.** of Portland submitted a low bid of $12,661,246 for construction of nonoverflow dam between spillway and powerhouse and for fishlocks and approaches at The Dalles Dam.

UTAH

CONSTRUCTION IS WELL PAST the 20% completion mark on that portion of the Salt Lake City suburban city district work held by Statewide Plumbing and Heating Co., Inc. Max L. Burdick, president of the company, states that they are working on the toughest section of the job lying in a very wet low area. They are using six trenching machines on their $1,093,000 contract.

ANOTHER STEP FORWARD on the Weber Basin Project near Salt

"The right wire rope? That's *EASY* every time!"

IT'S A CINCH to pick the right wire rope for top performance in excavating and construction . . . and it pays off! Roebling's new catalog has a section devoted to rope for the excavating and construction field . . . shows at a glance the best rope for each purpose and gives you a simple, unique code number ordering system which for the first time in wire rope history *positively* identifies the desired rope.

Write for your copy of the new "Roebling Wire Rope Recommendations and Catalog". And remember that the Roebling Field Man at your nearest Roebling office or distributor is always available to help find the answer to special wire rope problems.

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BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

Lake City comes with the announcement by the Bureau of Reclamation of a $819,000 award to the Wheelright Construction Co. This contract calls for construction of an earth dam 40 ft. high and 500 ft. long and the furnishing, laying and testing of 4 mi. of concrete pipe. Work should be starting about the first of this month and is to be completed in 700 calendar days. The Weber Basin Project is the largest Reclamation project ever authorized by Congress for Utah—$70,350,000.

RECENT MAJOR CONTRACT AWARDS and low bids in Utah include a low bid of $819,610 submitted by **Wheelwright Construction Co.** of Ogden for construction of the Weber Dam and 4 mi. of precast concrete pipeline.

WASHINGTON

THE BASIC PIER STRUCTURE of the First Avenue South bridge has been launched and is now floating alongside the yard of the General Construction Co. of Seattle. Concrete piers will be built up on each end of the hollow basic structure. It will then be towed upstream to the bridge site and sunk in place. Bids were to be opened in January for the upper concrete portions of the main bascule piers. To be included in the same contract will be the steel bascule spans and the flanking steel approach spans.

SURVEYING CREWS are busy laying out approaches for preliminary work on design of the $4,610,000 Maple Street toll bridge in Spokane. Tudor Engineering Co. of San Francisco was named by the City Council to proceed with final decisions, surveys, and diamond drilling. Actual field work is being conducted by Kenneth P. Norrie and Associates for Tudor. All information obtained is purely for design purposes. A bond issue will be necessary to provide funds for construction.

ANNUAL INSPECTION of the underwater portion of the bucket at the base of the spillway of Coulee Dam was to be conducted by television recently. A diver was to move a TV camera along under water while government engineers would have the opportunity to see at first hand what the diver saw. Determination of necessary repairs will be greatly aided.

THE 3-MI. LONG Vancouver freeway project is scheduled to be opened to traffic by mid-March. The $7,000,000 state highway has been under construction since 1951. Concrete paving has been completed by N. Fiorito & Sons. All that remains are final completion of interchanges and

NEW

INTERNATIONAL 60,000 GVW 6-WHEELER

With New 212 hp. Royal Red Diamond Engine

There's a new model in the INTERNATIONAL line of 6-wheelers — a model with the power to haul capacity loads over the roughest terrain — a model built to absorb severe loading shocks, and with ability to move heavy loads long distances over-the-road at maximum safe speeds.

The new RF-230 is powered by the new INTERNATIONAL 212 hp. Royal Red Diamond 501 engine delivering 444 lb-ft torque at 1600 rpm. It has hydraulic full-power steering, 12-volt electrical system, other features. Engine and all components are precisely coordinated to assure maximum operating economy, minimum maintenance and long life.

This newest INTERNATIONAL is Tough-Job engineered like all INTERNATIONALS — has a surpassing measure of the performance, strength and stamina qualities that have made INTERNATIONAL the 6-wheel sales leader for 20 straight years. It is built to do big jobs, save big money. Get full facts from your INTERNATIONAL Dealer or Branch.

QUICK FACTS...

GVW rating, 60,000 lbs.

Wheelbase, 175 inches; optional wheelbases available.

Engine, INTERNATIONAL Royal Red Diamond 501, 4½-inch bore, 5¼-inch stroke, 501 cu. in. displacement. Max. hp., 212 at 3000 rpm. Max. torque, 444 lb-ft at 1600 rpm.

Frame, double, heat-treated alloy steel. Two 15,000 lb. capacity front tow hooks, standard.

Clutch, 15-inch single plate with vibration damper.

Transmission, direct-in-fifth main plus overdrive auxiliary.

Standard equipment includes hydraulic full-power steering, air brakes, 12-volt electrical system.

Optional equipment includes LPG fuel system, Comfo-Vision space saver cab for maximum front axle loading; high altitude engine equipment; tinted safety glass all around.

INTERNATIONAL HARVESTER COMPANY · CHICAGO

International Harvester Builds **McCORMICK**® Farm Equipment and **FARMALL**® Tractors...Motor Trucks...Industrial Power...Refrigerators and Freezers

See the season's new TV hit, "The Halls of Ivy," with Ronald Colman and Benita Hume, Tuesdays, CBS-TV, 8:30 p.m., EST

INTERNATIONAL® TRUCKS

"Standard of the Highway"

a tie-up of the freeway with Highway 99 north of Vancouver.

A SCALE MODEL of the proposed $85,000,000 Noxon Rapids hydroelectric development to be built by Washington Water Power Co. is being constructed at Washington State College. The model tests provide important information for design engineers in determining cofferdam heights, closure problems, and capacity of spillway gates of the finished dam.

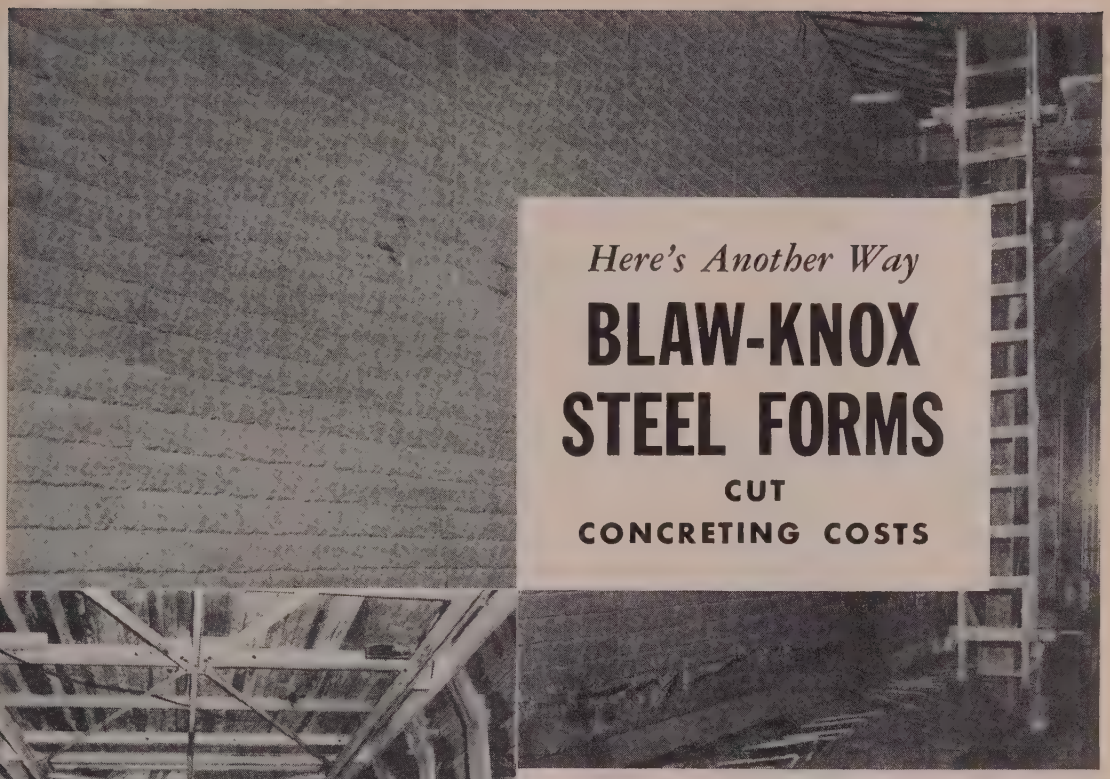
CONSTRUCTION OF the 3,400-ft. wharf at the Shell Oil refinery at March's Point near Anacortes is better than 40% complete. The entire project is on schedule and should be completed by the fall of 1955 according to H. F. Hicks, project superintendent.

RECENT MAJOR CONTRACT AWARDS and low bids in Washington include a $180,569 award to **Frank G. Baulne, Inc.,** of Yardley for 7.5 mi. grading and surfacing in Grant County. **Cherf Bros. & Sand Kay Construction Co.** of Ephrata received a $112,919 award for 0.2 mi. grading and surfacing an undercrossing south of Soap Lake in Grant County. **Peter Kiewit Sons' Co.** of Longview received a $172,594 award for 2.4 mi. grading and surfacing on the Birchfield-Moxee road in Yakima County.

WYOMING

BID CALLS can be expected in February and March from the Bureau of Reclamation on the Riverton and Kendrick projects. Two projects at Riverton will include construction channel changes and erosion control structures along Muddy Creek and construction of miscelalneous irrigation and drainage structures consisting of concrete turnouts, checks, weirs, and lateral and drain culverts. On the Kendrick projects the contract is to drill holes and apply sand and asphalt to underseal the concrete slabs of 13 transtions on the Casper canal and nine transitions on a lateral near Casper.

RECENT MAJOR CONTRACT AWARD and low bids in Wyoming include a $314,118 award to **Boatright-Smith,** Rawlins, for 7.0 mi. grading, draining, and surfacing on the Superior road in Sweetwater County. **W. W. Clyde & Co.** of Springville received a $450,161 award for 3.0 mi. grading, draining, and surfacing and construction of six bridges on the Kemmerer-Granger Jct. road in Lincoln County. **Jones, Hinckley & Jones, Inc.,** of Powell received a $272,585 award for 4.0-mi. grading, draining, and surfacing on the Buffalo-Kaycee road.



Here's Another Way

BLAW-KNOX STEEL FORMS

CUT CONCRETING COSTS

Blaw-Knox telescopic combined sidewall and arch forms (shown above) and telescopic ceiling forms were used on this West Virginia Turnpike Tunnel. Sidewall forms are provided with scoring wires.

BLAW-KNOX STEEL FORMS *with built-in scoring wire* **eliminate one costly step in concrete construction.**

When a concreting job calls for scored walls to provide better bonding for tile overlay, the simple method of welding scoring wires to the sidewall forms, developed by Blaw-Knox engineers, eliminates the once costly step of sand-blasting or hand chipping. After the pours are set, the forms are easily stripped with the aid of a screw jack integral with the forms, and the surface of the cast wall will be scored according to the pattern specified.

CONSULT Blaw-Knox in the preliminary planning stage of *your* job for ways to cut concreting costs. Blaw-Knox engineers, backed by over 40 years' experience as the original and most prominent steel form manufacturer, specialize in helping you plan for the simplified forming methods that often reduce the number of necessary operations, save time and materials and keep costs low.

BLAW-KNOX COMPANY
BLAW-KNOX EQUIPMENT DIVISION
PITTSBURGH 38, PA.
Blaw-Knox Pacific Coast Branch
818 Monadnock Building
San Francisco 5, California

BLAW-KNOX

STEEL FORMS

WRITE FOR BULLETIN 2430
It contains special design suggestions and complete details about Blaw-Knox Steel Forms and the consultation service that is available to any contractor without obligation.

CONSULTATION SERVICE BY BLAW-KNOX

ALASKA Newsletter

By CLIFFORD S. CERNICK, Anchorage

NEW YEAR EMPLOYMENT REPORT — Employment service officials in Alaska's two largest cities, Anchorage and Fairbanks, have issued figures on unemployment that should be of interest to newsletter readers. An analysis of these figures shows that construction industry employment is now at its lowest point in both cities. However, a check of contractors in the Anchorage area indicates that further reductions in employment from now on will be unlikely. Rather there will be a gradual increase each month until the construction season gets into full swing late in July and early August.

EMPLOYMENT IN ANCHORAGE—The Anchorage Employment Security Commission office reports nearly 2,000 claims for unemployment compensation. However, the total number of unemployed persons in the area is listed as 2,700, a drop from 3,200 one year ago at this time. Employment officials interpret this drop as being due to a smaller number of job seekers entering the labor market than was expected. Everything considered, the Fairbanks area had a better construction season in terms of total employment than Anchorage and apparently more workers were attracted to the Fairbanks area in the past year than to Anchorage. Persons now seeking work in the Anchorage area include 481 carpenters, 93 painters, 88 plumbers, 186 engineering equipment operators, 211 truck drivers and 412 laborers.

EMPLOYMENT IN FAIRBANKS—Right now there are approximately 1,500 construction men employed in the Fairbanks area as compared with 1,008 who are seeking work. The January figure for a year ago showed that 444 fewer construction men were working than are working now. Of the 1,008 persons now job hunting, 22 per cent are laborers, 20 per cent are carpenters, and 10 per cent are truck drivers. Of the remainder, 45 are plumbers and steamfitters, and 12 are electricians. A more favorable employment picture in the Fairbanks area is due partially to the fact that the past two months have seen high employment by government agencies seeking construction workers. Some 90 skilled craftsmen were hired at union scale to do maintenance work at military bases.

DELUGE OF MAIL — Union officials in Anchorage and Fairbanks report they are being swamped with mail from stateside job seekers interested in going to work on Alaska radar projects. Union officials have stressed that, contrary to recent reports, no work will start immediately on the Arctic radar projects and no hiring is being done yet according to best information received from government contractors and subcontractors. When hiring does start, priority will be given to local residents and men who were employed in Alaska last year.

MEMO TO CONTRACTORS — A short-lived labor walkout by carpenters working on the high school construction job in Anchorage provides a valuable lesson for contractors. The carpenters stated that they were leaving the job because untidy conditions were a menace to workers. A spokesman for the carpenters said debris, lumber scraps, and equipment left lying around on the job site were considered a hazard to life and limb. A walkout was ordered and work was halted on the huge project. Shortly afterward, Larry Moore, manager of the Associated General Contractors in Anchorage, made an inspection of the job site accompanied by business agents of other local craft unions and announced that conditions could not be described as so unsafe that men should be ordered off the job. Moore said, "The minor conditions we observed might better be classified as untidy rather than unsafe and the carpenters having detected them were derelict under the terms of the agreement for failure to refer the situation to employers for correction."

GOOD HOUSEKEEPING REQUIRED—The walkout on the Anchorage high school job provides an object lesson to contractors with regard to some of the hazards and responsibilities inherent in construction projects. Assuming that the carpenters were not justified in walking off the job, the fact remains that they apparently had a good pretext for doing so. It should therefore be incumbent on supervisors of jobs involving heavy construction activity to give utmost attention to good housekeeping practices. In this way a walkout might be prevented and money and time saved in pushing the job to completion.

CAT TRAIN SHIPMENTS — One of the largest mass movements of cargo from the seaport of Valdez to an undesignated radar site in the Arctic is expected to begin shortly after the middle of January when some 40,000 tons of heavy cargo will begin to be unloaded from trucks at the Yukon village of Circle City. That former gold rush boom town has been reported to be the jumping off point for cat trains heading toward the Arctic radar site. Cargo will be loaded on waunigans (snowsleds) which will be pulled by snowmobiles over the frozen rivers and lakes that lie between Circle City and the radar site. It will represent the first time an attempt has been made to move such a huge cargo overland to a remote base. Alaska Freight Line, which will supervise the move, has designed a special "snow-buggy" with huge wheels for traveling over snow and ice. The "buggy" is designed to carry up to ten tons of freight.

FASTER CARGO SERVICE—The new rail car ferry service planned for use between Puget Sound and Alaskan ports can well mean a cut in time of delivering construction cargo from the Pacific Coast to Alaskan job sites. Under the new service loaded railroad cars can be shunted onto a ferry and brought directly to an Alaskan port thus eliminating cargo handling at both ends. In Alaska, the railroad cars would move off the ferry and on to the Alaska Railroad line for delivery to various towns along the railbelt. The only detail unresolved as yet is the company that will undertake the service. The Interior Department has authorized two steamship firms to join with the Alaska Railroad in initiating the sea trains. Approximately 100 cars could be accommodated on each shipment.

FIRST POWER—The initial load of power from Alaska's biggest hydroelectric plant was sent surging over the lines on January 6 bringing completion to the 4-yr. Eklutna Project which cost $30,000,000. Turbines at the power plant are operated by water pressure diverted into a 4½-mile tunnel drilled through Goat Mountain. From the tunnel, water drops through a penstock with pressure estimated at 375 psi. The surge tank at the junction of the penstock and tunnel is a cushioning chamber for absorbing the momentum of water through the tunnel. The Eklutna Project was begun in October 1951 and provided employment at one time for as many as 400 workers. Its power will be absorbed by homes and businesses in the Anchorage and Matanuska Valley areas.

OIL BOOM CONTINUES—Interest in Alaska's oil potential continues without let-up as indicated by the filing of 45 new oil lease applications by the Shell Oil Company. The recent filings cover 99,840 acres of land on the Kenai peninsula, an area considered especially favorable for oil development. Besides Shell, a number of other major oil firms have filed leases on vast areas of Alaska especially the coastal regions. Initially these firms will be doing primarily exploratory work on these leases with actual drilling scheduled to begin this spring in several instances.

ENGINEERS on the move

Tom Halpin has recently joined the Washington Department of Highways as an assistant in the personnel office. Word has also been received of the transfer of **Huntley Grant** from the Vancouver office to the headquarters office in Olympia, where he is working as an assistant highway engineer in the plans and contracts division.

* * *

J. G. Lightfoot of the Fort Peck District (Mont.), Corps of Engineers, was recently reassigned from chief, engineering division, to assistant district engineer.

* * *

G. William Bailey was recently named chief engineer of Raymond Concrete Pile Co. As chief estimator for Raymond during recent years he has directed the preparation of many

Bailey

proposals for construction in this country and abroad. Bailey fills the vacancy created by the appointment of **Warren N. Riker** last July as district engineer at Boston.

* * *

Frank M. Clinton, regional director of Region 6, Bureau of Reclamation, recently announced the combining of the Yellowstone Projects Office at Billings, Mont., and the Bighorn Projects Office at Cody, Wyo., as the Yellowstone-Bighorn Projects Office with headquarters at Cody. The combined offices will be under the direction of **D. M. Forester** as supervising engineer. Forester was formerly in charge of the Yellowstone office.

Don G. Evans, construction engineer for the California Division of Highways, recently retired, marking the end of 26 years of State service. In the post of construction engineer, a position he held for the past three and a half years, Evans' scope of supervision of highway construction has been statewide, covering hundreds of projects along the 14,000-mi. state highway system. The supervision of the current construction program he turned over to his successor, **Milton Harris,** who was district engineer of District 9. **Frank E. Baxter** of District 2 replaces Harris at Bishop. **Walter M. Nett** will take over Baxter's post in Redding.

* * *

Resignation of **Howard H. Jenkins** as president of American Pipe & Construction Co. was recently announced. **Robert V. Edwards,** executive vice president, was elected to succeed him.

* * *

C. F. Wyller, who has been acting district engineer in Alaska for the Bureau of Public Roads since January 1954, has been appointed district engineer, with offices in Juneau. **M. M. Flint,** formerly with the Juneau office, who has been acting district engineer with headquarters at Missoula, Mont., has been officially made district engineer. Both men serve under **F. E. Andrews** of Division 8, Portland, Ore.

* * *

Charles Riggs, city engineer of Puyallup, Wash., recently resigned the post.

* * *

B. F. (Brad) Lockwood, Jr., is project engineer for Peter Kiewit Sons' Co. on a 3.9-mi. stretch of Ramona Freeway through El Monte, Calif. Until this recent assignment, he was with Kiewit on the Eastshore Freeway in Oakland.

* * *

Linn S. Spaulding, until recently with Brown - Pacific - Mason, San Francisco, has joined the National Park Service, as park engineer at Death Valley National Monument, Calif.

* * *

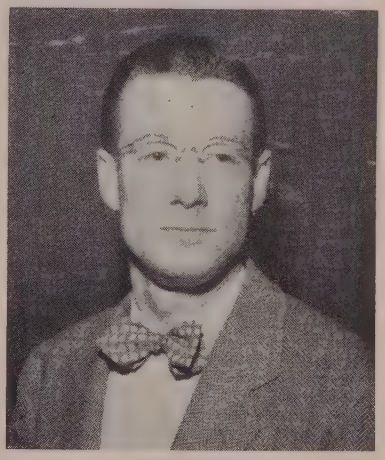
Merrill W. Bird recently became a partner in the newly formed general construction company operating at Sacramento, Calif., under the name of Skamnes, Bird & Wiggs Co., Inc. Bird was formerly connected with Pacific Bridge and The Duncanson-Harrelson Co., while Skamnes and Wiggs were with U-P-K.

* * *

Contracting office for J. H. Thorpe & Son, fire brick and industrial insulation constructors, has been opened in Seattle. **Willard Smith** is northwest manager for three states, Idaho, Oregon, and Washington. **Maurice E. Drenkel** is superintendent in the Seattle office, and **Paul Burge** is company foreman in charge of a Portland branch.

* * *

S. D. Burks, former deputy chief of the Foundations and Materials Branch, Corps of Engineers, Sacramento District, Calif., lately identified with the Folsom Dam Project, recently joined Dewey & Almy, Construction Specialists Division, as a field engineer at Cambridge, Mass.



Burks

* * *

James H. Anderson, engineer with the California Division of Highways, has changed from Dist. 7 at Los Angeles to District 1 at Eureka where he is district traffic engineer.

* * *

Levant R. Brown recently retired from the Bureau of Public Roads after completing 46 yr. of Government service, the last 35 with the Bureau. Since 1925 he had been assistant to the Division Engineer of Division 7. Another change in Division 7 concerns reassignments for two engineers. **W. H. Baugh,** project engineer, has been transferred to the Arizona District office at Phoenix, Ariz., to take over area engineer duties. **W. H. Oliver** takes over Baugh's old position in California.

* * *

J. L. Savage, consulting engineer of Denver, Colo., is the man who prepared plans for Gorge High Dam under the supervision of Seattle City Light Skagit Project Division headed by **Charles E. Shevling.** Other key engineers on the project are: **C. Ray Hoidal** and **E. R. Schindler,** design engineers; **Robert E. Brown,** resident engineer; **H. M. Lees,** concrete engineer; **E. J. Drobnack** and **A. L.**

Gustanoff, assistant design engineers; and **Ray Halvorsen,** field office engineer.

* * *

Peter J. Bier, recently retired from the Bureau of Reclamation after 30 yr., has established a consulting practice with offices at 680 South Gaylord

Bier

in Denver. Continuing in his former specialty, Bier is consulting on penstock and steel pipe design, specifications and inspection.

* * *

Howard Sievers of Everett, Wash., has been named president of the newly organized Asphalt Paving Association of Washington, a non-profit organization sponsored by contractors in Washington who are engaged in building streets and highways. Headquarters have been established in the White-Henry-Stuart Bldg., Seattle, with **Carl V. Kilgore** as executive secretary.

* * *

Paul Odegard of the Odegard Construction Co., Everett, Wash., was recently elected 1955 president of Seattle Chapter, Associated General Contractors, succeeding **Olav Boen** of the Boen-Koon Construction Co. Those elected to serve with Odegard are: **Donald L. Clark** of the W. G. Clark Co., vice president; **Gordon A. Mowat** of A. F. Mowat Construction Co., vice president; **David Brazier** of Brazier Construction Co., secretary; and **John Boespflug** of J. C. Boespflug Construction Co., treasurer.

DEATHS

Roscoe F. Cole, retired Corps of Engineers employee and former resident engineer at Empire, Ore., and the Coos Bay area, died in early December.

* * *

Alfred K. Stillman, 54, civil engineer of Olympia, Wash., died Nov. 29 in a Seattle hospital. At one time for a period of several years he had been with the State Highway Department and until last year when he reopened an office in Olympia, he had been a partner with DeWitt C. Griffin in Seattle.

* * *

John W. King, 71, former city engineer of Elko, Nev., died there on Nov. 29.

* * *

Tobias E. Jacobsen, 60, building contractor of Inglewood, Calif., died recently.

CALENDAR

Feb. 2-4—Institute of Transportation and Traffic Engineering, 7th annual California Street & Highway Conference, at the University of California, Berkeley.

Feb. 6-11—American Society of Civil Engineers, national convention, Hotel U. S. Grant, San Diego, Calif.

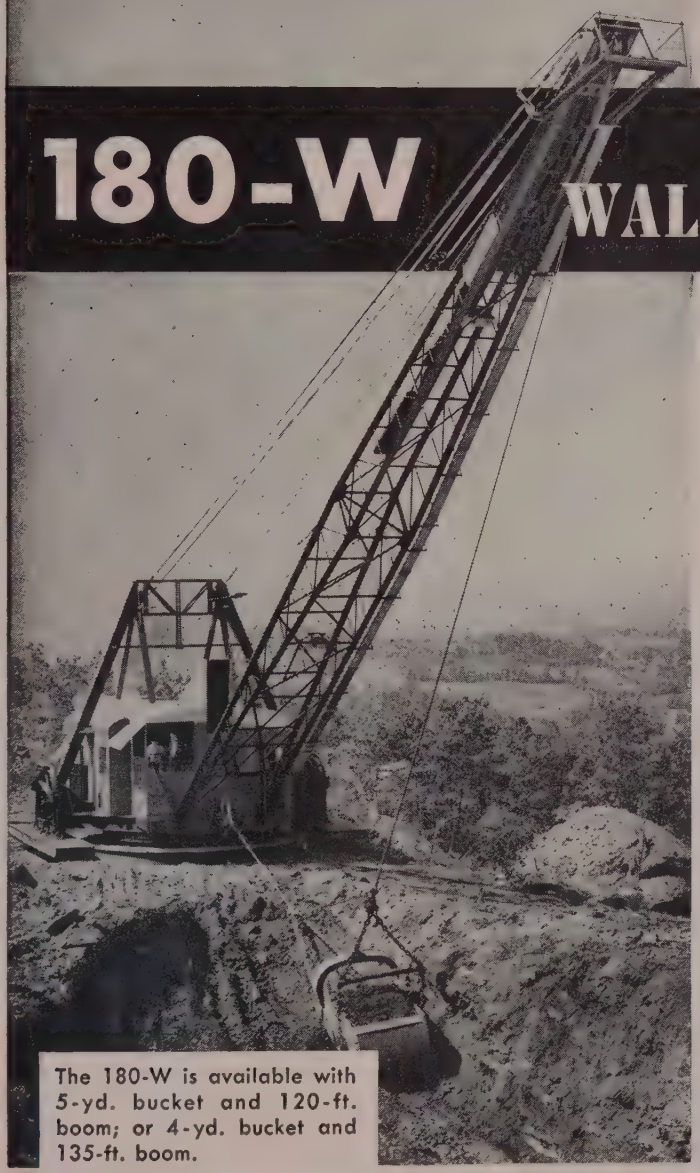
Feb. 7-9—Association of Asphalt Paving Technologists, annual meeting, Jung Hotel, New Orleans.

Feb. 24-25—Highway Engineering Conference of the University of Colorado, annual conference, Boulder, Colo.

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

Readily Dismantled
Readily Assembled

180-W 5-cu. yd. WALKING DRAGLINE



The 180-W is available with 5-yd. bucket and 120-ft. boom; or 4-yd. bucket and 135-ft. boom.

Now you can put real high-capacity digging ability to work wherever your job takes you. The Bucyrus-Erie 180-W walking dragline offers unmatched ease of erecting and shipping for a machine of this type.

Only partial disassembly is necessary for moving from one job to another — the entire machine is easily loaded on five U. S. railroad cars. This not only saves time and expense in moving, but increases the machine's value throughout its entire life.

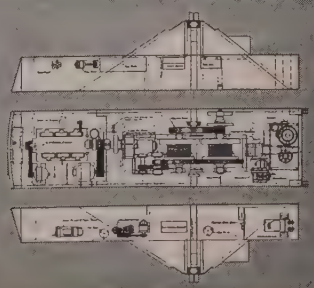
In addition to its exceptional portability, the 180-W offers dependability, big output, long working reach, maneuverability and low maintenance for which Bucyrus-Erie draglines have earned an outstanding reputation. Send for complete information. 14L54

BUCYRUS ERIE

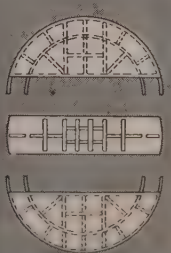
South Milwaukee, Wisconsin, U. S. A.

Entire Dragline Easily Loaded On Five U. S. Railroad Cars

Side wings unbolt from center section of revolving frame. Main machinery remains fully assembled and in proper alignment.



Base is in three separate welded-steel sections, joined by bolting flanges — easily disassembled and shipped.



SUPERVISING the jobs

Bill Hitt is supervising a $665,982 contract of Peter Kiewit Sons' Co. for construction of the First Ave. south bridge and approaches, King County, Wash., a job which started Dec. 1 and will run 270 days.

* * *

George Carlin, project engineer; **C. W. Evans,** superintendent, and **R. T. Vogel,** manager, make a top trio directing the work of Cen-Vi-Ro Pipe Corp. which is executing a $1,376,755 contract for earthwork, pipelines and structures, including pumping plants, Friant-Kern Canal, Central Valley Project, Calif. Job has been running since late last August and will close early in 1955.

* * *

D. D. Kaun, project manager, and **C. R. Shearman,** general superintendent, are supervising a $1,502,156 contract of the W. Case Corporation for the Middle Cross Feeder and Inglewood Lateral, Los Angeles Water District. **G. H. Blanchart** is office manager.

* * *

Milton Gracia is general superintendent for the Madonna Construction Co. which is doing a $1,598,111 job involving 2.7 mi. of grading and surfacing and 5 bridges between Arroyo Grande and Pismo Beach, Calif. Also working on this job as concrete superintendent is **Les Johnson.** Construction will extend into 1956.

* * *

Larry Arpin is supervising a $256,224 contract of Vega Engineering & Grading Co. for earthwork, clearing, and structures for rehabilitation of drains on Unit SW-2, Middle Rio Grande Project, New Mex. Foreman on the construction is **Gordon Elmore. Joe Cassano** is timekeeper.

* * *

Russ Koons, general manager; and **Ed McPherson,** superintendent, head the construction crew building the Airport Junior High School, Los Angeles. McDonald Bros. holds the contract at $2,077,777. Job is expected to end by August 1.

* * *

R. A. Merfoot is superintendent for Cox Bros. Construction Co. which is doing a highway job consisting of 2.9 mi. of grading and surfacing on La Habra road between Grand Ave. and 0.2 mi. south of Imperial Highway, Orange and Los Angeles counties, Calif., including construction of a concrete bridge. Work is being done at a contract price of $231,933, and will probably be finished by the first of March.

* * *

Lou Curtis, earthwork superintendent, and **Jim Malone,** concrete superintendent, are top supervisors directing the construction of earthwork and structures on East Low Canal Laterals on the Columbia Basin Project, Wash., for Cherf Brothers, Inc. and Sandkay Constructors, Inc., holders of the $1,676.547 contract.

* * *

N. W. Axline, superintendent; **C. M. Cossott,** assistant superintendent, and **A. C. Simson,** equipment superintendent, head the construction personnel of the Tiffany Construction Co., which has a street contract in Phoenix, Ariz. The $153,986 contract is for 3 mi. of grading and draining and select material base, beginning at 24th St. and extending east over Thomas Rd. to 48th. Work is just about completed.

* * *

Bob Kenney, superintendent, with the help of **Delmer McCray,** foreman, heads up the crew of Deith Bros., contractor on the 6.5 mi. job on Quartz Creek road, Umpqua National Park, Ore. This $187,679 contract is expected to end this September.

* * *

Harold Singleton is general superintendent for E. H. Moore & Sons, contractor building the John Muir Junior High School in San Leandro, Calif. Other key men on this $1,309,600 project are **Earnest Williams,** superintendent, and **F. Mast,** foreman. Work will finish this summer.

* * *

Pat Doyle, superintendent; **Hank Beltz,** general foreman; **Wayne Littlefield,** steel erection foreman; **Bob Woods,** steel assembly foreman; and **Dick Newell,** tower foundations foreman, comprise the top supervisors for Parker-Schramm Co. which has a $456,169 contract for completion of Schedule 5: Wishram-Ross section, McNary-Ross 345-kv. 41.2-mi. line. This is a Bonneville Power Administration contract in Skamania and Clark counties, Wash., scheduled for completion in September.

* * *

Eugene S. Roberson is superintendent for Carl N. Swenson, contractor on 0.3 mi. of reinforced concrete bridge and box culvert work on Main Street in Los Gatos, Calif., a $353,478 contract which is expected to be completed the middle of 1955.

* * *

Frank O. Muren is general superintendent of a $817,627 contract awarded Fredericksen & Kasler for 7.6 m. of surfacing and 3 reinforced concrete bridges between Deer Creek and Linda Vista Ave. in Tulare County, Calif. **Carl E. Whetaire** is construction superintendent. Other key personnel are **Norman D. Mason,**

Down-time . . . . . By Domagalski

"Project manager? Hell no—he's the compressor operator!"

Western Construction

Down time gives anyone the freezin' fidgets. Best way to avoid it is to insist on genuine CAT* parts every time. That's the only way to be sure of getting parts that are made to the latest design, precisely manufactured of the right materials, rigidly inspected and tested.

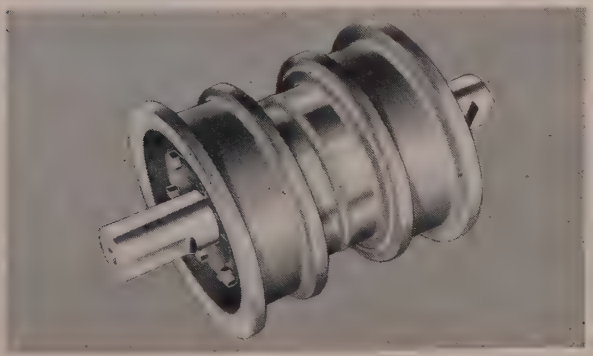
Take track rollers, for example

Some makes of track rollers may look alike—at first glance. But look closely at a genuine Cat roller: deep-hardened forged steel rims, center welded to prevent spreading . . . one-piece shaft . . . cast iron hub of high compressive strength to lessen bore distortion . . . specially alloyed bronze bearings . . . shaft wearing surfaces "Hi-Electro" hardened. With a substitute roller: who can be sure?

The difference on the job: with genuine Caterpillar-built track rollers you get extra trouble-free hours of profitable production, and top performance in even the worst working conditions.

With substitute parts: who can be sure? **Better get genuine Caterpillar parts every time.**

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



CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

Keltner *Degan* *Cox* *Keller* *Saucerman* *Rethmeier* *Owen* *Premer*

Mills *Sabin* *Dakolios* *Steele* *Carey* *Baugh* *Peters* *Bruner*

Harold Buddemeyer, project manager; and **Roy Keltner,** general superintendent, head the construction force working for F & S Construction Co. which is executing a contract awarded by Hoffman Homes for the erection of 5,000 dwellings at Thornton, Colo. Assisting these two top supervisors are the following assistant superintendents: **George Keller, Earl Steele,** and **Charles Cox. Thomas V. Christlieb** is project engineer. **Chester R. Dow** is field engineer. **Joe Tinianow** is tract accountant; **Dan Levine** is tract purchasing Dagent; and paymaster is **S. F. Dakolios,** assisted by **Carl Sabin.**

Superintending the crafts are **John L. Baugh,** brick; **Alvin F. Davis,** concrete; **James W. Mills,** mill; **Russell D. Yingling,** labor; and **Ed Degan,** equipment. **Harry B. Buck** and **Elmer L. Crabbe** are general carpenter foremen, and the following are carpenter foremen: **William H. Eckman, Beryle H. Harper, Joy J. Harper, Victor E. Hobbs, Wayne K. Johnson, Ray Owen, Melvin Plambeck, Garland Premer, F. W. Rethmeier, Jr., Victor A. Saucerman, Dewey J. Tyrrel,** and **Andrew Windholz.** Other foremen are: **Ervin Nightengale,** labor; **John H. Benskin,** equipment (night); **George R. Wren,** equipment (day); **Leonard Flynn,** truckdriver; **Clyde Guthrie, Alva A. Hoag,** and **Frank Mora,** cement finisher; **Robert Carey** and **Melvin Peters,** mason; **Ramsey Bruner** and **Robert Henderson,** hod carrier; **Guy E. O'Brien,** ironworker. Work on this project started last September and is likely to run through 1956, and probably well into 1957.

grade superintendent; **Clarence W. Ayers,** carpenter foreman; **John R. Knott,** mechanic foreman; **Dorothy N. Leyh,** timekeeper, and **J. P. Coyle,** accountant. This is about a year's job ending probably in mid-summer.

* * *

Joab N. Fadel is superintending for **Norman I. Fadel,** contractor working on the Elmer J. Chesbro Dam on Llagas Creek in Gilroy, Calif. Job started in July last year and will probably finish July 1955.

* * *

M. J. Ruddy, Jr., of the contracting firm of M. J. Ruddy & Son is himself managing a $218,134 contract under way on U. S. 99 in California. Work involves 7.7 mi. of grading and surfacing. **Fred H. Sattler** is engineer, and **Glenn Hagar** is in the superintendent spot. Work will be completed soon.

* * *

Charles H. Dahlgren and **Louis Bodeen,** partners in the firm of Dahlgren Construction Co., are directing a $434,574 job which is under way in Skagit County, Wash., Dahlgren as general manager, and Bodeen as superintendent.

* * *

R. E. Martin, is superintendent; **W. M. Nellis** is grade foreman, and

Turtle Club

Howard Ross, an employee of The Dalles Powerhouse Constructors, The Dalles, Ore., became a qualified member on Oct. 16, 1954. He was climbing a ladder when a piece of ½-in. rod, 4 ft. long, fell a distance of about 85 ft., striking his hard hat with great force, but inflicting no injury on the workman.

* * *

Jacob J. Wolff, Sr., was saved from injury, but qualified on Oct. 1, 1954, at the Hanford Works in Richland, Wash., where he is employed by The Kaiser Engineers. A sheetmetal worker atop a ladder drilling holes in an air duct had laid the electric drill on the duct and climbed down to move the stepladder. In doing so the cord became tangled, causing the 7½-lb. drill to fall, landing on Wolff's hat.

* * *

Harry De Mello Cabral, employed by James M. Glover Ltd., Hilo, Hawaii, was operating a 1½-cu. yd. shovel on Sept. 7, 1954, at a location in Kaawalii, Hawaii. While bucking a shovel against a rock, the ⅝-in. boom cable snapped and hit Cabral on the head. He received lacerations and a bruised shoulder, but lost no time from work. He is now a full fledged member.

* * *

Bruce Steiner, employee of Macco Corporation, on Oct. 20, 1954, was at work on the Union Pacific lease in Wilmington, Calif., when a piece of 5-in. reinforcing pipe, 17 ft. long was being lowered from an oil derrick. The 225-lb. pipe caught on top of the well guard, causing the sling to loosen and allowing the pipe to fall, hitting Steiner. Outside of shoulder and back contusions he was not hurt and qualified as a member.

* * *

New applicants should write Editor, **Western Construction,** 609 Mission St., San Francisco 5, or to E. D. Bullard Co., 275 Eighth St., San Francisco 3.

Welton Andreen Rowe Peterson Holderman Corbett Davenport Massey

Cerny Conyers Wattis Allen Armstrong Duncan Powers

J. C. Stewart, project manager; H. J. Rowe, general superintendent; J. C. Andreen, assistant superintendent (plant), and C. B. Welton, area superintendent (railroad), are the key men for Utah Construction Co. and Stearns-Rogers Manufacturing Co., joint venture firm constructing the $120,000,000 railroad, mill, and smelter for the San Manuel Cooper Corp., located 45 mi. north of Tucson, Ariz. Working on the mill area buildings and utilities under Andreen are the following superintendents: Claude Sheppard, steel, and assistant Joe Borders; J. R. Fields, mechanical; D. R. White, carpentry; Howard F. Conyers, building; and Herb Alexander, master mechanic.

Under Welton, who is in direct supervision of all railroad construction, the following men are assisting: Shern Hellerud, excavation superintendent, and his assistant R. R. (Dick) Dawson; George Jones, assistant superintendent (track); and Lowell Cooper, structural superintendent (bridges and trestles). Frank V. Urban is area superintendent, in charge of work at the smelter building and mine area. Dick Laird is assisting him. Electrical work on this project is being done by Newbery Electrical Corp., with George Kalaf superintending.

In the engineering department, the following key men are on the job: A. L. Duncan and Jim Holderman, area engineers; S. T. Benson, electrical engineer; N. A. Miller, railroad engineer; P. R. Newell, construction engineer; C. B. Stetson, field engineer, and B. A. Ayers, assistant field engineer; and C. O. Swanson, section engineer.

Bert Corbett is party chief. The following are general foremen: A. Winfrey, sewer; George Freeland, excavation; Sam Allen, electric; George Powers, carpenter. Foremen are: G. W. Jones, and Jerry Iolia, railroad track; and G. A. (Tex) Davenport, D. F. (Doug) Massey, and Lee Dodd, all structural steel; Bill Berner, truck and tire shop; L. R. Wattis, labor; R. C. Armstrong, J. M. Cerny and Conrad E. Peterson, carpenter; George Sole, equipment; R. E. Sullivan, rigger; and B. J. Ketchum, welding. Ed Barrins is chief guard; Bud McKinney, timekeeper; and J. M. Vancant, safety.

This project involves 29 mi. of railroad from the mill site to Hayden, Ariz., connecting with the Southern Pacific; a 1,580-ft. steel girder bridge across the Gila River, two other 500-ft. steel girder spans, and 25 wooden trestles. The mill area will be connected with the mine at Tiger by 7 mi. of railroad and there will be 6 mi. of track in the area itself.

The mill site will take in the following buildings: a structural steel 800 x 250-ft. concentrator building, a crusher building, smelter, plant powerhouse, molybdenum plant, machine shop and other maintenance facilities. Five 1,000-ft. wells were drilled to furnish water for the plant and for the San Manuel townsite.

Earl Nelson, labor foreman, for Martin Construction Co. on a $158,091 contract for grading and paving on Route 84, Florence-Tucson highway, Arizona.

* * *

Al Webb, general superintendent, is supervising the construction of bridges and some grading on the Copper River highway in Alaska for B-E-C-K, McLaughlin, co-venturer, recently awarded the contract at $2,739,390. Don Flake is heavy equipment foreman. Toby Perry is office manager. This construction will probably run through 1956.

* * *

Dick Watson, superintendent, with the assistance of Dalos Bowman, is supervising a $226,432 job of Gem Construction Co. in Camas County, Idaho. Another key man working at the site is Rix Pepper, foreman. Work involves constructing a roadway on 8.1 mi. of Highway 68.

* * *

Richard Preston, J. L. O'Nell and Don Tallman, crusher, grade, and oiling foremen respectively, are all working for Richard Beshey on this contractor's $226,051 contract for 11.9 mi. of grading and surfacing on Indian Cove road in Owyhee County, Idaho. Job has been under way since early July 1954 and is all done except seal coating which is expected to be finished June 1.

* * *

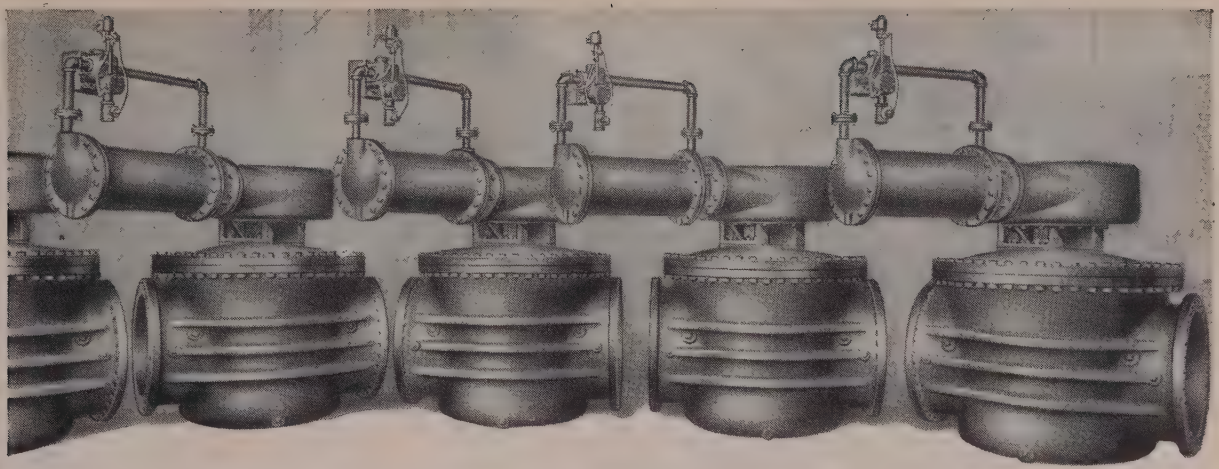
Keith J. (Mickey) Erickson is supervising a $1,029,714 contract which has been under way since September, consisting of grading and paving E. B. Hamilton road to National Ave., a 6.2-mi. stretch in Lewis County, Wash. Martin Dicsburg is master mechanic. According to Erickson Paving Co., contractor, work will probably be finished in November this year.

* * *

Glenn Fredrickson of the firm of Fredrickson Brothers is acting as general superintendent for his company on a $333,110 contract for grading and surfacing 4.1 mi. of highway on Route 90 and constructing a concrete slab bridge, north of Madison in Yolo County, Calif. Arch Edmonds is job superintendent.

* * *

Robert F. Calou, superintendent; Walter Thompson, structures superintendent, and Dean Gross, engineer, comprise the top men for Fredrickson & Watson Construction Co. which



36" CONE VALVES *with clear* OPENING

To supplement its hydro-electric power, TVA has built a series of steam plants on the Tennessee and Ohio rivers. These new units will furnish power required for Atomic Energy and other projects.

In this vital program, 52 Chapman Automatic Cone Valves were utilized for these plants . . . to act as check valves on the condenser water pumps. Each of these valves weighs approximately 11 tons.

Chapman designs and builds these valves in a range of sizes from 6" to 48" for check, throttling, pressure reduction and stop valve service. This is only one of many special Chapman valves. Remember, there's no problem in flow control that's too big or too tough for Chapman. That's why it saves time and money to *check with Chapman first, every time.*

The CHAPMAN VALVE
MANUFACTURING COMPANY
INDIAN ORCHARD, MASSACHUSETTS

SCHEDULED FOR COMPLETION in the fall are the power plant at Folsom Dam and the Nimbus power plant down stream. Shown here are some of the principal men working on this over-$850,000 contract held by Stolte, Inc. Top row, l. to r.: *Warren L. Mooers*, project manager; *William U. Kearney*, millwright superintendent; and *Maurice Tidwell*, carpenter foreman, all working for the prime contractor. Also *Jerry Gizdich*, superintendent for Del Monte Electric Co., subcontractor. Bottom row, l. to r.: *Jules Toliver*, electric foreman; *Homer Medlock*, USBR electric inspector, and *Cliff Parvin*, electric foreman; *Jess Sites*, general foreman for Del Monte, with *Earl Agee*, inside foreman; and *George Tilman*, foreman at Folsom for Monterey County Plumbing Co., another subcontractor. At Nimbus, *Al Goodyear*, whose picture is not shown, is working for this plumbing subcontractor as foreman.

has been working on the Eastshore Freeway in Oakland, Calif., a $1,659,775 contract expected to be completed in September.

* * *

E. L. Gribble, superintendent, with the assistance of the following foremen: **E. L. Allen** and **S. C. Williams** (grade), **Thomas W. Dudley** (labor), and **Leonard Wolverton** (crusher), is directing Marion J. Hess' contract for 7.2 mi. of highway work in Malad and Oneida counties, Idaho. Hess got the contract on a $611,710 bid.

* * *

G. M. Newberry, field superintendent; **B. B. Edwards**, plant superintendent; and **J. N. Burnham**, coordinator, are key men working for United Concrete Pipe Corp. on a $3,902,976 job comprising earthwork, concrete pipe lines, and structures in connection with Davis Aqueduct on the Weber Basin Project, Utah. Work is expected to run well into 1957.

* * *

R. H. Richards, project manager; **A. B. Summers**, project superintendent; **H. Altman**, project engineer; and **J. E. Elkington**, purchasing agent and office manager, are important personnel on a $712,900 contract held by Johnson Western Constructors and Clyde W. Wood & Sons, Inc., for concrete overlay on floor of Drydock 1 at the Naval shipyard, Long Beach, Calif.

* * *

J. F. Porcher, division manager; **H. G. McGregor**, job superintendent; and **R. C. Preston**, in charge of the job office, are key men working for Griffith Company on a project in Southern California. Work has been under way since mid-August last year and involves 3.3 mi. of grading and paving between Durfee Ave. and east of Puente Ave. in Los Angeles County. It is a $3,338,857 contract.

* * *

Tom Delaney is project superintendent; **Wayne Kellogg** is project engineer; and **Fred Johnson**, field engineer, on construction of a major part of the Fairbanks water distribution system in Alaska. Peter Kiewit Sons' Co. holds the $1,287,423 contract.

* * *

O. L. Wyle, project engineer, **J. Robbins**, superintendent; and **Richard Bailey**, field engineer, are key men working for Robert E. McKee, Inc., on construction of class rooms and offices at the University of California at Los Angeles. Contract price, $1,184,075.

* * *

Bob Millard is superintendent for England & Roth Construction Co. on an 11-mi. grading and surfacing job in Carter County, Mont.

* * *

George W. (Buck) Fink, general superintendent; **Robert F. Dashiell**, project engineer; and **Woodrow J. (Woody) Rasmussen**, office manager and timekeeper, are key men working for The Duncanson- Harrelson Co. on its $3,017,427 contract for bridge construction and road detour at Richardson Bay, 5 mi. north of San Francisco. Job started Sept. 15, 1954, and will probably finish September 1956.

* * *

James Reed and **R. M. Jensen**, partners in the construction firm of Reed & Jensen, are in over-all supervision of the company's contract for 4.3 mi. of grading and gravel surfacing of the Vernal-Manila route, Ashley National Forest, Uintah County, Idaho. **Buy Nye** is grade foreman on this $190,000 job.

* * *

Axel Hallberg, superintendent; **John R. Engstrom**, timekeeper, and **Martin Rice**, carpenter foreman, are key men on the construction of a headquarters building for Pacific Mutual Insurance Co. in San Francisco. MacDonald, Young & Nelson is doing the work for $1,117,000.

* * *

D. E. Thompson, general manager; **J. W. Davenport**, superintendent, and **Al Howland**, foreman, comprise the top personnel of R. H. Flickinger who has a $309,434 storm drain job at Pasadena, Calif., for the Los Angeles Flood Control District.

* * *

Jack Cook, vice president, and **Doyle Weigner** are supervising the over-all construction of sewage collection lines by the City and County of Salt Lake City, Utah, a $1,623,000 contract being executed by Schmidt Construction Co.

* * *

H. B. Hanson has been working as superintendent for Halvorson Con-

struction Co. on grading and surfacing job on the Belknap Springs highway in Lane County, Ore. Because of the winter, work on this $269,951 job is shut down for the present.

* * *

W. H. (Herb) Ellis, project manager; **Reino Huttula,** resident engineer; and **John Kennedy,** assistant superintendent, are key men on the steel and concrete bridge being erected on the North Fork American River below Auburn, Calif. This is a county and state project contracted to James B. Allen at a cost of $225,000.

* * *

Glen O. Parsons is project manager for George A. Fuller Co., contractor on the 1,000-bed addition to the USN Hospital under construction at San Diego, Calif. **Henry E. Sexton** is supervising the job. Mechanical engineer is **Philip L. Brady, Jr.**; field engineer is **R. W. Murphy**; field accountant is **W. F. Oseland.**

* * *

George N. Hopkins is superintending the construction of a bridge located at 68th & Halsey Sts., Portland, Ore. This work is being done for the State by United Builders, Inc., with **Paul S. Taggart,** vice president, in overall charge of the $140,000 contract. Located on the Portland-Beaverton highway, the structure is a 224-ft. overpass; three spans, of which the center is a 130-ft. 8⅞-in. prestressed box girder. Hopkins until recently was with the Oregon State Highway Commission, where he spent two years as a civil engineer in the bridge department, primarily concerned with layout, grades, concrete mix, design, and general construction supervision.

* * *

Paul Barnard, general superintendent; **J. L. Saylor,** general foreman; **George Learned,** carpenter foreman, and **Jack Etter,** labor foreman, are top personnel working for J. H. Thompson & Son on the new freeway through Banning, Calif. A State Highway job, contract involves four bridges, and work is expected to be completed this coming June.

* * *

J. T. Melvin is supervising the construction of a Safeway Store in El Centro, Calif., a $275,000 contract now being completed by Bitter and Haddock Engineers.

* * *

L. A. Baker is general foreman for V. R. Dennis Co. on a storm drain contract on the 10th St. pier at San Diego, Calif.

* * *

Arthur W. Dorsey is project superintendent for Guy F. Atkinson Co. on construction of the J. H. Davies bridge at Long Beach, Calif. Other key personnel are: **Robert McKray,** general foreman; **Bob McCluney** and **Jim Johnson,** pile driver foremen; **John Zorka,** labor foreman. **George Collins** is in the office; **Art Morning** is engineer, and resident engineer for the State is **John Nesmith.** Work is expected to continue through 1955.

* * *

Bill Gotham is superintendent on the $200,000 construction of a tilt-up warehouse for the Port of San Diego, Calif. Work is being done by Trepte Construction Co.

* * *

Wilbur Camp is superintendent and **James S. Downing** is his assistant on construction of the Margaret Hendricks School at El Centro, Calif., a $400,000 addition. The contractor, L. C. Anderson Co., is working on three other schools in El Centro.

* * *

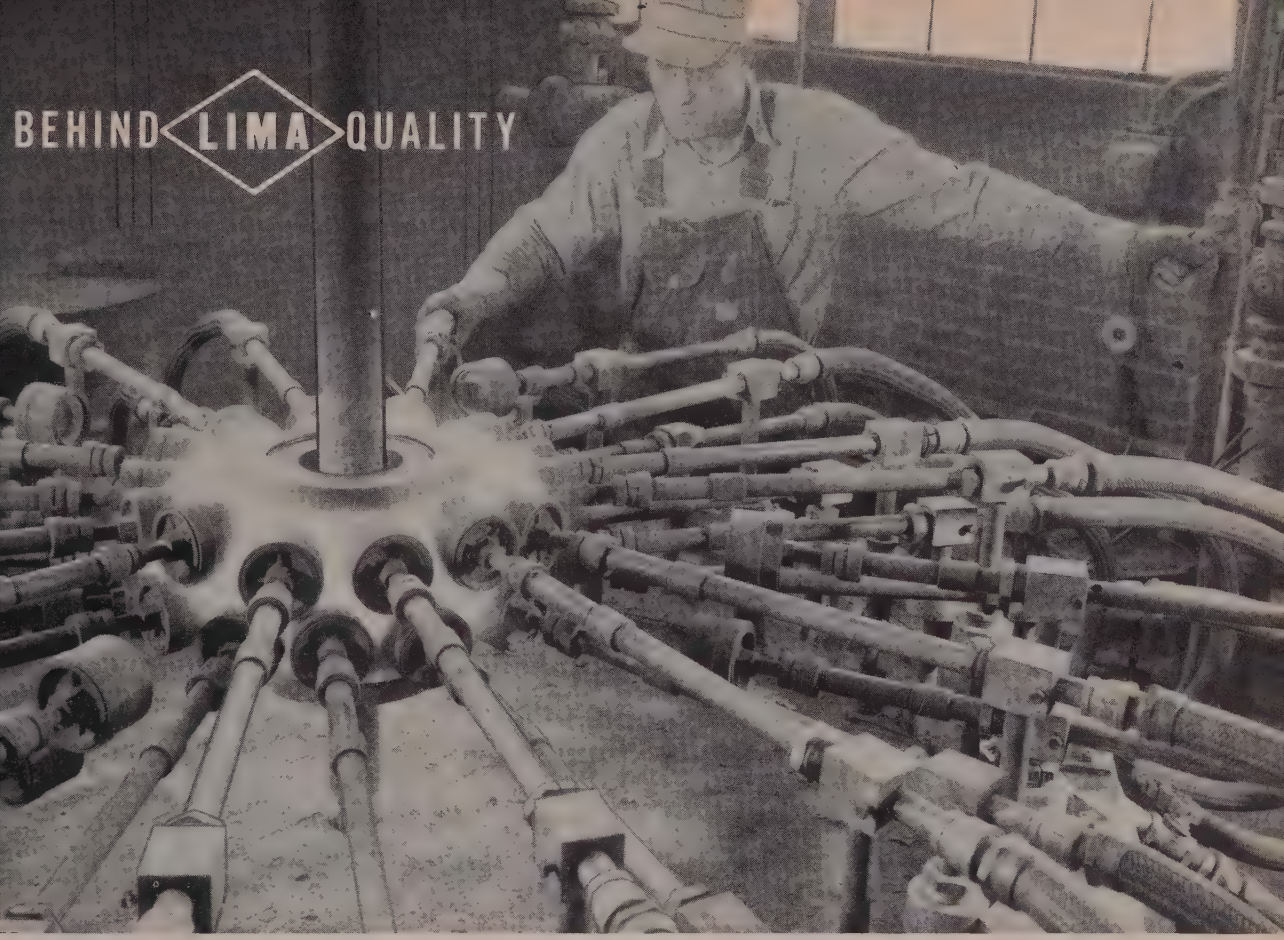
Leon H. Murphy who has been supervising construction at Salem, Ore., and at North Richland, Wash., is now millwright superintendent for Kaiser Engineers at North Richland.

* * *

A. W. Poulson, superintendent; **Elvin Pate,** assistant; and **Jim Linehan,** concrete superintendent, are working for Davies, Keusder & Brown, contractor on a group of buildings for Specialty Shops at Lakewood, Calif. This $800,000 job is scheduled for completion in April.

* * *

Paul Kiley, engineer for L. S. Whaley Co., is working on construc-



Heat treating gives **LIMAS** greater strength and longer service life

In the 1500 degree F. circle, formed by this battery of gas burners, is a shipper shaft pinion destined to become a vital part of a LIMA shovel. This heat, the succeeding water quench and controlled tempering process, establishes a uniform hardness up to two inches in depth to the teeth and teeth base of the pinion. This means longer serviceable life to this important part.

Flame and induction hardening are used on rollers, gears and shafts of every LIMA machine. Heat treating, used with our know-how, is one of the reasons why LIMA is known throughout the world for quality—cost-conscious equipment men everywhere are saying, "you can depend on a LIMA for low maintenance and less down-time."

COMPARE QUALITY! No other machine gives you as much as LIMA!

1. Piston ring type dirt seal rings and retainers in crawler rollers.
2. Moving parts are flame or induction hardened for longer life.
3. Main machinery is placed well back of center of rotation.
4. Anti-friction bearings at every vital bearing point.
5. Big capacity drums and sheaves are easy on cables.
6. Propel and swing gears and power take-off are enclosed in a sealed oil bath.
7. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

The above advantages contribute to LIMA'S greater output, less down-time and lower maintenance.

COMPARE and you'll specify LIMA for shovels (¾ yd. to 6 yds.), cranes (to 110 tons) and draglines (variable). Smaller capacities available on rubber.

LIMA Type 604—1½ yd. shovel on highway work in Colorado.

Our Seattle Office: 1932 First Avenue South, Seattle 4, Washington. Feenaughty Machinery Co., 112 S. E. Belmont St., Portland 14, Oregon; Feenaughty Machinery Co., 600 Front St., Boise, Idaho; Smith Booth Usher Company, 2001 Santa Fe Ave., Los Angeles 54, California; Modern Machinery Co., 4975 Third Ave. South, Seattle 4, Washington; Alaskan Distributor, Western Tractor & Equipment Co., 2230 First Ave. South, Seattle, Washington; Shriver Machinery Company, P.O. Box 1270, Phoenix, Arizona; Heiner Equipment & Supply Co., 501 West 7th South, Salt Lake City, Utah; Bay Cities Equipment, Inc., 2606 Cypress St., Oakland 7, California; Cheyene Truck & Equipment Company, 621 Central Ave., Cheyene, Wyoming; Acme Iron Works, Culebra Ave. at Expressway N.W., San Antonio, Texas; Cascade Industrial Supply, Highway 99, So. Redding, California; Contractors Equipment & Supply, P.O. Box 456, Albuquerque, New Mexico; Modern Machinery Company, 4412 Trent Ave., Spokane 2, Washington; Faris-Moritz Equipment Company, 1095 South Jason St., Denver, Colorado; McGaraghan Supply Company, 529 Broadway, Eureka, California.

BALDWIN BLH LIMA-HAMILTON

LIMA SHOVELS · CRANES · DRAGLINES · PULLSHOVELS

BALDWIN-LIMA-HAMILTON

Construction Equipment Division · LIMA · OHIO · U. S. A.

tion of a department store project at Los Altos, Calif. Working on the same construction for the contracting firm of Millie & Severson are the following key personnel: **James N. Lessley,** superintendent; **Carl Lang,** general carpenter foreman; **Leo Murray,** general labor foreman; **Ralph Sourk** and **Bob Friesmeyer,** carpenter foremen; and **Murray Harris,** office manager. This is the first of 22 stores which will comprise the new Los Altos shopping center.

* * *

Ed Einer is superintendent on a 1½-mi. highway and bridge construction over Lake Hodges on Highway 395 in Southern California. **Roy Neujahr** is bridge superintendent. Resident engineer for the State is **Max M. Johnson.** Einer Brothers, Inc., and Marsch Construction Co. has the contract.

* * *

Among recent awards going to Allison Honer Co., in California, with construction now under way, are the following: $645,898; Science Building, Long Beach State College; **Jack Devlin,** superintendent; **Bill Johnson,** general foreman; and **Larry Cenotto,** labor foreman. $523,858: Science and Gymnasium Buildings, Santa Ana College; **Carl (Pop) Moore,** superintendent, and **"Red" Shane,** general foreman. $451,743: State Farm Mutual Insurance Bldg., Santa Ana; **Erwin Kind,** superintendent. $234,259; Post Exchange and theatre buildings at Camp Pendleton; **Jim Alderson,** superintendent. $237,898; warehouse and office building, Alpha Beta Markets, La Habra; **Jack Devlin,** superintendent, and **E. E. Harris,** general foreman.

* * *

Besides **W. W. White,** job superintendent; **Brad Lockwood,** project engineer; **J. D. Brown,** mechanical superintendent, and **Jim Fuller,** office manager, as previously reported in these pages, the following are additional key personnel of Peter Kiewit Sons' Co. on the nearly $6,000,000 Ramona Freeway job in Los Angeles County, Calif.: Superintendents—**Ed Lynch,** structures; **C. B. Smith, Robert McKinney** and **Lou Adams,** bridge; **Fred Welch,** excavation; **Edw. Olcott,** utilities; and **"Heinie" Franklin,** drilling. Foreman—**H. M. Moore,** labor; **C. A. Kinsey** and **Ray Fowler,** excavation; **T. E. Martin** and **T. C. Blazer,** heavy duty repair; **Don Oakley,** concrete placing; **Wally Tope,** cement finisher; and **W. R. Smith, Glen Jones, R. J. Tice, H. E. Vocke, "Spike" Longnecker, L. L. Smith,** and **H. M. Henderson,** carpenter. **Don Fix** is engineer, **Russ Davis** and **Lloyd Loeterlee,** structures.

* * *

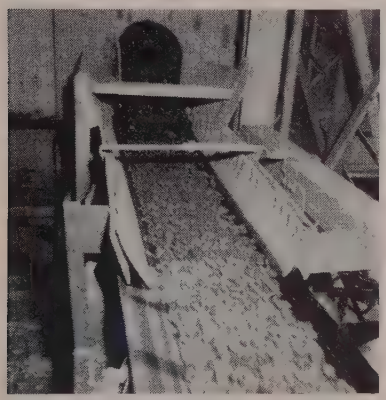
R. L. Dever, superintendent, assisted by **T. C. Carr,** bridge foreman, and **Paul Taylor,** crusher foreman, is supervising an Armstrong & Armstrong contract for grading and surfacing 4.8 mi. of road in Dona Ana County, N. M., a $524,155 contract.

TRICKS of the TRADES

Rubber skirtboards will save belting

IT HAS LONG been the custom to use old belting for skirtboards at the loading end of conveyor belts. This is rather costly false economy. The old belting is stiff; its fabric picks up moisture. Sand and grit collect along the edges and quickly grind the life out of the belts. Home-made skirtboards also require frequent adjustment and replacement.

Enlightened operators, like the installation to be found at Pacific Coast Aggregate Co.'s Pleasanton, Calif., plant, use molded rubber skirtboards



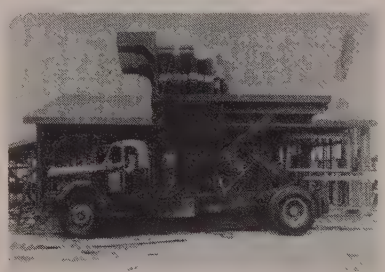
which are smooth and resilient. They won't pick up moisture and grit, and can be set closer to the belt to keep material from creeping under the skirtboard. The rubber skirtboard "gives" upon contact with the belt instead of grinding into it, and seldom requires adjustment. The installation pictured has been in operation over 6 yr. There is no evidence of the wear line on the belt cover under the skirtboard.

Practically all major belt manufacturers offer rubber skirtboards, but seldom feature them because they are a minor part of their lines.

Scissors truck-lift

THE PIONEER ROOF CO. of Los Angeles, Calif., installers of general roofing for residential, commercial, and industrial buildings, have "pioneered" a new kind of truck that permits the unloading of the entire quantity of roofing material at working level.

Using a model F50L Reo, a 14-ft. steel platform with special bulkhead and cab shield was built. This platform, able to carry a net load of 16,000 lb., can be elevated 11 ft. above the ground making possible the unloading of bulky roofing material directly on the roof itself. In this way,



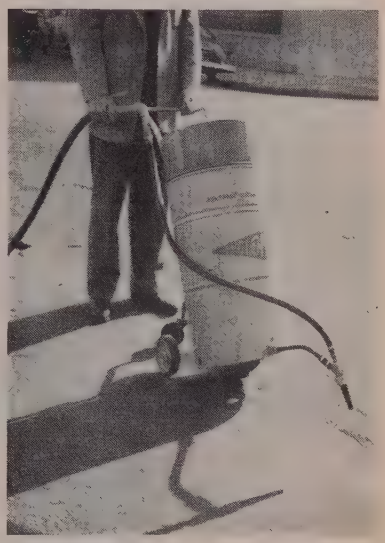
Pioneer eliminates double handling, the traditional block and tackle, and dangerous ladder climbing on most of its jobs.

The Reo has a 200-in. wheelbase, air brakes, an FE-900 Timken front axle, 2200 rear axle, and 11.00 x 20 tires. The scissors hoist is a Gar Wood D-66 Hylift hydraulic hoist. The unusual new truck was developed for Pioneer by engineers of Reo Truck Leasing, Inc., a subsidiary of Reo Motors, Inc., of Lansing, Mich.

Sandblast away the white stripe

AN ALL PURPOSE portable cyclone sandblaster is now available that can be used for any abrasive blast cleaning need and that has the added function of being designed to remove painted traffic lines from black top or concrete streets or highways.

Easily converted to a traffic line remover, the unit is moved along the



line allowing the operator to remain erect guiding the blast by means of the castor wheel mounted behind. Instant control over the blasting is afforded by a shut-off valve located under operators hand. A screen is provided to allow abrasive re-use,

HUGE SHORING JOB

Workmen tilt up two-frame units of "Trouble Saver" sectional shoring as work progresses on the new service building being erected in Los Angeles for Broadway-Hale Department Stores. Nearly 6,000 prefabricated steel frames are being used, making it one of the West Coast's largest shoring projects. C. L. Peck Co., Los Angeles general contractor, is using the frames to shore the 8-in. mushroom-type slab for the second floor. Chaix and Johnson are the architects and Brandow and Johnson the structural engineers.

and the abrasive may be loaded directly into the hopper at any time.

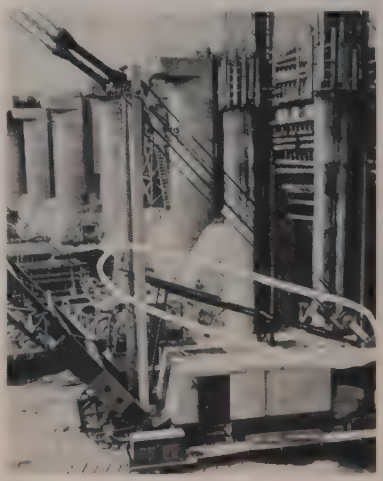
This special Cyclone model was designed with the aid and collaboration of city and highway engineers and its use results in effective cost reduction and ease of operation.

Stop that boom before it goes over

TWO NORTHWEST contractors solved a ticklish construction problem by using Rud-o-Matic Thomas automatic boom stops to provide a vital safety factor on a difficult job. The contractors, C. J. Montag & Sons and McNutt Bros. of Portland, created their own problem by proposing to precast huge spillway bridge sections and tainter gates on the ground, then hoist them into position for Dexter Dam near Eugene, Oregon.

They faced the task of lifting seven gates, each weighing 44 tons, and spillway sections up to 73 tons, high up on the dam structure. Taking every precaution to prevent injury and equipment damage, they equipped their 100-ton crane with Rud-o-Matic Thomas boom stops for the big lift.

These unique stoppers, built by the McCaffrey-Ruddock Tagline



Corp. of Los Angeles, differ widely from ordinary mechanical devices that merely limit boom travel. Most stoppers seldom are able to prevent costly damage if the operator continues to boom up after hitting the stop. Thomas boom stops are designed to stop accidents before they start.

Operation of the automatic boom stops is simple. Dual spring-loaded rams, mounted on the "A" frame of the crane, provide a soft, cushioning effect that checks critical movement in the event a load cuts loose and the boom whips back. The two rams allow 12-inch travel as they arrest boom motion. Pressure on the M-5,000 increases from about 250 up to 5,000 lb., while the M-10,000 permits increased pressure to 10,000 lb.

At 200-tons per hour, aggregate for damming the Damodar River moves by S-A Conveyor from the secondary crusher (right foreground) to a battery of S-A screens over storage bins.

A conveyor belt under these storage bins reclaims aggregate and moves it to the concrete batching plant as needed. Underground S-A conveyor is 720-feet long and handles 300-tons per hour.

S-A Conveyors Help Dam India's "River of Sorrow"

Flowing through the heart of India's fuel-metal producing center, the tranquil Damodar River becomes a raging torrent in the monsoon season. Property damage, and human misery follow, making the Damodar truly a "River of Sorrow."

The Damodar Valley Corporation, with a series of huge dams, has brought the river under control and converted the rampaging waters to the more useful job of producing hydro-electric power and irrigation.

Aggregate for the Maithon Dam, number three in the project, was supplied to the concrete batching plant by an S-A conveying system which included belt conveyors, screens, feeders and bin gates. The Stephens-Adamson equipment was furnished through Eastern Equipment & Sales Ltd. of Calcutta, associates of Atkins, Kroll & Co. located in San Francisco.

With the completion of the Maithon Dam in late 1954, the entire conveyor system was dismantled and relocated at the Panchet Hill Damsite. Again at work, it is another example of an S-A system "engineered for the job."

Stephens-Adamson equipment and engineering can team up to solve your conveying problems. Write for a survey.

SINCE 1901 S-A STEPHENS-ADAMSON MFG. CO.

STEPHENS-ADAMSON MFG. CO.

Factories at Aurora, Illinois • Los Angeles, California • Belleville, Ontario

2227 E. 37th Street
Los Angeles 58, Calif.

1007 E. Burnside St.
Portland 14, Ore.

151 Mission Street
San Francisco 5, Calif.

714 Joseph Vance Bldg.
Seattle 1, Wash.

TOOLS of the TRADES

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

A NEW PORTABLE electric drill incorporating 10 advantages usually found only in more expensive models is being marketed in the low price category. Model 137 Porter-Cable Drill offers a rugged 115-volt motor with spur-type reduction gears and an idling speed of 2,300 rpm. for the broadest number of uses. The drill has a precision-ground, gear-type chuck to prevent slipping. It has compact features for close quarter work measuring only 2 9/16 in. wide, 5 5/16 in high, and 7½ in. long. Distance from center line of chuck to top of housing is only 15/16 in. Its light weight of 2¾ lb. makes it easy to use overhead or in cramped spaces. Other features are self-lubricating, bronze bearing and steel ball bearing, large fan for cool running, and an aluminum body. For price and literature on drill write **Porter-Cable Machine Co.,** 52 Exchange St., Syracuse 8, N. Y.

ELIMINATION OF SHARPENing and high replacement costs are benefits claimed for a new disposable power saw blade developed by **Rocco Products,** Dept. KP, 2916 Fourth Ave. South, Minneapolis 7, Minn. The throwaway blade is made of nickel-hardened chromed steel and is available in two sizes, 6 in. and 8 in. Replacement cost, the company points out, is so low that it becomes economically profitable to discard and replace blades when they become dull. Further information is available.

SOCKET WRENCHES — **Owatonna Tool Co.,** 389 N. Cedar St., Owatonna, Minnesota, has announced a new assortment of socket wrenches in a plastic tool roll, plus an extra stock of flex head wrenches in various sizes. The socket wrenches flex to any position in a 180-deg. radius permitting access on tough jobs. They combine the features of a box wrench and a universal socket and have thin straight walls for maximum clearance.

"WHY ABRASIVE WHEELS FAIL —sometimes"—is a 40-page book published by **Wallace Tube Co.,** 1304 Diversey Parkway, Chicago 4, Illinois. The book is written in simple, easy to understand form about a subject on which very little information is available. It explains why abrasive wheels fail and how it prevents this failure. Drawings, charts, and tables describe the operation of the company's abrasive blades.

"GOOD OPERATING PRACTICES" is the title of an illustrated 12-page brochure published by **Johns-Manville.** It contains 101 suggestions for maintaining plant buildings and equipment. Included are recommendations for getting the best service out of insulations, packings, refractory products, roofing, and friction materials.

A NEW TYPE of safety shoe has been developed expressly for hot-mills, refrigeration departments, ice plants, mines, or wherever feet are exposed to extremes of heat or cold. The shoe is padded with a thin layer of foamed vinyl. Vinyl padding is superior to other insulating materials because it does not absorb moisture, perspiration, oil, or odors, according to the manufacturer, **Lehigh Safety Shoe Co.,** Emmaus, Pa.

CRAWLER TRACTOR track master pins on all Allis-Chalmers and International tractor models can now be easily and quickly removed and installed with the new OTC hydraulic track master pin removing and installing set. Power to do this difficult operation is provided with the OTC 50-ton power-twin, center-hole ram. Other uses are for pulling and installing drive sprockets and on a forcing press. Complete details and price can be obtained from **Owatonna Tool Co.,** 389 N. Cedar St., Owatonna, Minnesota.

WIRE ROPE CUTTERS—Hammer-blow type cutters handling wire rope up to 1½-in. diameter are available in three models from the **Montgomery Mfg. Co.,** 24 Austin St., Newark 5, New Jersey. With a proper size sledge, three or four raps will cut the rope neatly without flattening or fraying the ends as it cuts. It has three round cutting blades of tool steel, one on top and two below. It is safe, rugged, and simple to use. Sizes and prices are: Model A, ¾-in. capacity—$12; Model B, 1-in. capacity—$21; Model C, 1½-in. capacity —$35.

NEW LITERATURE

For your convenience in obtaining free copies of literature described, the company address is provided with each review.

Dump bodies, hoists described

Complete specifications are included in the new 4-page catalog on Galion Allsteel heavy duty dump bodies and matching hydraulic joists. Line drawings and cutaway views illustrate this Catalog L-9886 from **Galion Allsteel Body Co.**, Galion, Ohio.

Allowable load values given

Artcor building specialties are described in a new brochure, AIA file 14-J, giving allowable load values and other specifications on joist anchors, tie straps, split ring timber connectors, post bases, plate washers, and clip angles. Newly assigned catalog numbers for these products are given in the brochure published by **Arch Rib Truss Corp.**, P. O. Box 6742, Los Angeles 22, Calif.

Catalog on bituminous finisher

A catalog on the Model 879-A finisher has been issued by **Barber-Greene Co.**, Aurora, Illinois. Drawings show the machine's principles of automatic leveling and thickness control, tamping compaction and control of crown and super-elevation. Cutaway photographs explain the inner mechanisms. Also pictured are several accessories which are available.

Adams motor grader detailed

Adams motor grader Model 660, powered by 140-hp. Cummins diesel engine, is described in a catalog released from **J. D. Adams Manufacturing Co.**, Indianapolis, Ind. Construction, operating advantages, and machine's applications are covered, as well as a wide variety of optional equipment.

Booklet on Ross carriers

"The One-Truck Fleet" is the name of a 16-page booklet on Ross Carriers, put out by **Clark Equipment Co.**, Benton Harbor, Mich. Specifications on the various models are included with a number of documented case histories.

Skookum blocks and forgings book

A 24-page catalog gives specifications on Skookum hoisting blocks, sheaves, cheek weights, swivel hooks, clevises and hooks. Line drawings and illustrations portray the products in the book by **Skookum Co., Inc.**, 8504 N. Crawford street, Portland 3, Ore.

New wire rope terms cataloged

New general wire rope identification terms, giving former description and new catalog description, are featured in a handbook-size, fully-indexed and tab-indexed catalog issued by **Macwhyte Company**, Advertising Dept., Kenosha, Wisc. In addition to the new specifications and tables, there are 73 pages of information on specifying, use, and care of wire rope.

Trakloader multi-purpose crane

Washington Iron Works, 1500 Sixth Ave. So., Seattle 4, Wash., has issued Bulletin TL-11, on its TL-11 Trakloader, multi-purpose crane for use in logging and allied industries. Specifications, power and handling information and on-the-job photos are featured.

Prestressed concrete folder

Specifications and line drawings are features of the prestressed concrete folder, AIA file 4-K, issued by the **Empire Pre-Stress Concrete of Oregon**, N.E. 92nd and Halsey st., Portland 20, Ore.

Brochure on Mortemp heaters

Mortemp's Model L and H portable heating units are described in a 6-page brochure published by **Mortemp Division** of Mechanical Products Manufacturing Co., 1727 First ave. So., Seattle 4, Wash. Specifications and illustrations of possible uses are featured.

B&L elevating grader attachment

Detail illustrations and specifications of the B & L elevating grader attachment for Galion motor graders are the feature of a folder issued by **Barnard & Leas Manufacturing Co.**, Cedar Rapids, Ia.

Transport trailers catalog

Illustrations and descriptions of 16 various models are included in the Transport Trailers folder. Write **Transport Trailers, Inc.**, Cedar Rapids, Ia.

Expanded shale aggregate data

Basalt Rock Co., Inc., Napa, Calif., has issued a 10-page booklet on the new Basalite lightweight concrete with "expanded shale" aggregate. Complete specifications and a number of charts give the story on the lightweight aggregate.

Kelly Ball penetrator story

Procedure of the Kelly Ball penetrator in testing consistency of freshly mixed portland cement concrete and samples of published reports on the method appear in the folder issued by **F. R. Killinger Equipment Co.**, 4514 Hollis st., Oakland 8, Calif.

Noble facilities told

An 11-page booklet published by **Noble Co.**, 1860 Seventh st., Oakland 20, Calif., explains and illustrates their facilities for design, engineering, fabrication, installation, repair, and modernization of custom-built materials handling equipment and machinery. Several custom jobs are portrayed.

Haynes hard-facing manual

"Haynes alloys hard-facing manual" is a 40-page book that gives such information as how to select the right hard-facing material, what metals can be hard-faced, procedures for hard-facing, properties of hard-facing alloys, and typical industrial applications. Many charts and illustrations are included. The booklet is given out by the **Union Carbide and Carbon Corp.**, 725 S. Lindsay St., Kokomo, Ind., or district offices.

Ingersoll-Rand hoist catalog

Form 5300-A, by **Ingersoll-Rand Co.**, 11 Broadway, New York 4, N.Y., is a 43-page catalog of their line of air and electric hoists. Specifications, capacities, symbols, and outstanding features of each type are given, with accessories available. Tables covering weights of materials and rope pull and cross sections, line drawings, and cutaway views are also given. Remote control units are cataloged.

Standard RB asphalt plants book

Complete line of RB asphalt plants and their accessories is given in a 16-page catalog produced by **Standard Steel Corp.**, 5001 So. Boyle ave., Los

Angeles 58, Calif. Catalog covers layouts available, flow charts, and complete data on all major parts and accessories.

Hoist catalog published

Yale & Towne Manufacturing Co., Philadelphia 15, Pa., has issued a 16-page brochure on the Yale Cable King line of wire rope electric hoists. The catalog contains cutaway charts and diagrams on the equipment.

Teco Trip-L-Grip folder

A pocket-size folder called "Teco Trip-L-Grip framing anchors for floor and ceiling framing" has been released by the **Timber Engineering Co.**, 1319 Eighth st., N. W., Washington 6, D.C. Detail drawings show where and how the different types of anchors can be applied.

New Atlas-Copco catalog

A 10-page catalog of Atlas-Copco mining and construction equipment is available from **Copco Pacific, Ltd.**, 930 Brittan ave., San Carlos, Calif. Descriptions, illustrations, and some specifications are given on their rock drills, air pusher legs, drill steels, extension steel, bits, compressors, and other Atlas-Copco equipment.

Literature briefs . . .

STANDARD OR CUSTOM slings —Macwhyte has 'em all: round-braided, flat-braided, and single-part. They are listed and illustrated in Bulletin 5308, **Macwhyte Company**, 2940 14th Ave., Kenosha, Wisconsin.

MALL TOOL CO. has new literature covering a new item in their line, the "Pow'r Trow'l." Ask for it from **Mall Tool Co.**, 7706 S. Chicago Ave., Chicago 19, Illinois.

CONTRACTORS' PUMPS by Gorman-Rupp range from 1½ in. to 10 in., from 5,500 gal. per hr. to 240,000. Write to **Gorman-Rupp Co.**, Mansfield, Ohio, and ask for Contractors' Pump Bulletin No. 4—CP-11.

VIBRATORS AND SCREEDS, singly or together, are covered in Bulletin 526, offered by **Stow Manufacturing Co.**, 56 Shear St., Binghamton, N. Y.

"THE INSIDE STORY" of Detroit Series 71 diesel engines tells of new engineering on an established 2-cycle line. Get it from **Detroit Diesel Engine Division**, General Motors, Detroit 28, Michigan.

A SCREEN FOR EVERY JOB, says **Screen Equipment Co.**, Buffalo 25, N. Y. Send in for Seco's free literature, Catalog No. 203.

NEW EQUIPMENT

For your convenience in obtaining more information quickly, the manufacturer's address is provided with each review.

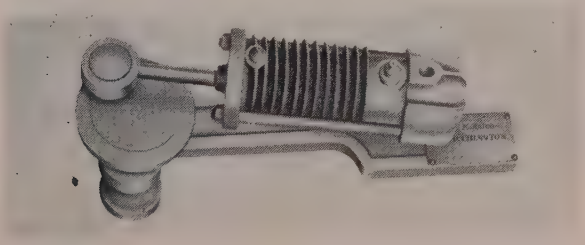
New loader for John Deere tractor

Greenville Steel Car Co., Greenville, Pa., has announced the production of a loader for exclusive use with the John Deere 40-C tractor. The tractor-loader unit has a 7-ft. 11-in. clearance in dumping, with a 2-ft. 6-in. reach at maximum height. All hinge points have replaceable lubricated pins and bushings. The loader can be removed in 45 min. Other attachments, such as a ¾-yd. bucket, fork lift, or a scarifier, are available.

Can you use 2 cfm?

That's right—2 cfm. at 400 rpm., with pressures up to 120 psi. That's the performance of a new gadget available to the construction field.

It's the Worthington-Mobilco air compressor that attaches to the power take-off of any tractor. Just slip the compressor shaft sleeve over the splined take-off shaft



and secure a thumb screw. The compressor frame rests against the tractor frame when the take-off shaft is started.

The question is: What to do with it? **Worthington Mower Co.,** Stroudsburg, Pa., suggests using it to power-lubricate equipment right in the field, or to pump fuel, spray paint, or check tire pressure. You can even get a change-over piston and cylinder kit, and make the unit into a pump for water. Here's a gadget with a challenge!

60 yd. per hr. from a batch plant on wheels

Complete concrete batching facilities, including power and controls, have been built into a single semi-trailer that weighs and measures with the legal limits for highway travel in most states. First designed to broaden the operational area of ready-mix concrete producers, the new unit is becoming a construction contractor's item idealy suited to medium-sized, short-time jobs at any isolated location.

The Noble-Mobile has a 3-compartment aggregate bin

good for 28 tons, and 1,000 cu. ft. of bulk cement storage. The plant produces 2-yd. batches, with fully automatic control of cement weighing, and optional manual or automatic weighing of aggregates.

Portability and quick set-up and dismantling times are the biggest features claimed by the manufacturer, **Noble Co.,** 1860 Seventh St., Oakland 20, Calif. The Noble-Mobile is ready to go, with built-in air compressor, water meter, and panel board with switches for all motors. An extra tractor and semi-flatbed are handy for moving the elevator and conveyor and any other extras the owner may tack on. For instance, the aggregate bins can be charged by front-end loader, or an extra receiving hopper and conveyor can be added.

"Efco" is a new line of concrete forms

Supplementing an established rental line of steel forms for concrete construction, **Economy Forms Corp.,** P. O. Box 128, H. P. Station, Des Moinies, Iowa, has now placed on the market a new selection of steel-faced forms for purchase by contractors.

The new Efco forms are designed for use with the same pins, clamps, and ties that fit Economy rental forms. More information, including catalog showing the panels, tools, and accessories, is available from Economy Forms Corp.

Scraper added to line

Allis-Chalmers Co. has added a medium-sized, rubber-tired, pull scraper, Model 108, with 8.4-cu. yd. struck and 11-cu. yd. heaped capacity. The new model brings to 8 the number of Allis-Chalmers pull scrapers now available. Cable operated, Model 108 is of welded box type construction with an overall length of 27 1/3 ft., overall

width of 10 1/3 ft., and load-carrying position of 7 2/3 ft., in height. Width of the cut is 8½ ft. and depth ranges up to 10 in. Features of the new unit include its 3 piece reversible type cutting edge heat treated and hard faced, and positive forced ejection. Shipping weight is 15,250 lb. Address: P. O. Box 512, Milwaukee 1, Wisc.

Elevating grader attachment throws 1,000 cu. yd. per hr.

W. A. Riddell Corp., Bucyrus, Ohio, announces an elevating grader attachment specially designed for use with Warco 4D-85 and 4D-115 motor graders. Casting capacity

is claimed to be between 1,000 and 1,800 cu. yd. per hr.

Main elements of the attachment are a 30-in. adjustable disc of alloy steel, and a 42-in. wide conveyor belt. Standard length of the attachment is 16 ft., but 3-ft. sections are available for addition to give maximum length of 22 ft. The attachment is hydraulically controlled from the grader cab.

Rugged Work and a hose to match!

U. S. 4810 Air Hose

Jagged rocks, grinding gravel, severe cold and sun checking, punishing impacts from heavy equipment—all these were faced *and licked* by the "U. S." engineers who designed U. S. 4810. Reason enough why it's become one of the most popular of all hose for mines, quarries, shipyards and general construction work.

Combining super adhesion, great strength, high resistance to cuts and abrasion, and extreme *flexibility*, U. S. 4810 is recommended for all pneumatic tools and air drills, for use *wherever* high working pressures, abrasion, and general abuse pose problems.

Service-packed, economical U. S. 4810 Air Hose is available from any of our 27 District Sales Offices, or by writing to the address below. *Whatever* your hose requirements, you'll find it pays to turn to "U. S." There's a job-engineered U. S. Hose for practically every purpose — an expert staff of "U. S." Engineers to assist you with your hose selection.

- tough, flexible tube of neoprene provides top oil resistance
- high-tenacity, tire-type cable rayon braids give tremendous carcass strength
- thick cover of cut-resistant natural rubber wards off damage from rocks, tools, and equipment

"U.S." Research perfects it..."U.S." Production builds it...U.S. Industry depends on it.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes
Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

Two-way radio for noisy areas

Operating flexibility and extra power to overcome high audible noise levels are characteristics of a new radio system now in production at **Motorola**, 4545 W. Augusta Blvd., Chicago, Ill. It provides a means of directing a work crew's activities as well as communicating with headquarters and vehicles. It is recommended for use in industrial areas characterized by high audible noise levels from machinery and trucks. The unit operates interchangeably with either a 6- or 12-volt battery installation. Further information is available.

Full range of depth and width with new spreader

The New Leader Model AS will spread bituminous concrete or aggre-

gate from ½ in. to 8 in. deep. Spreader sizes include widths of 8, 9, 10, and 12 ft. The unit will handle up to 4-in. rock in base course work.

Uniform action is assured by a staggered line-up of 10 pneumatic wheels, according to **Highway Equipment Co., Inc.**, 616 D Avenue N. E., Cedar Rapids, Iowa. The spreader screed is adjustable by controls at either end, and a hydraulically operated shut-off gate controls materials flow.

Air-cooled gasoline engine

Kohler Co., Kohler, Wis., is now manufacturing the K160, a 4-cycle, air-cooled gasoline engine. The machine-faced crankcase and threaded power take-off shaft extension make the engine particularly adaptable for direct mounting on pumps. The engine weighs 67 lb. It includes valve rotators, oil bath air cleaner, flyball governor, ball bearings at both ends of the crankshaft, and a dust-proof and moisture-proof breaker point assembly.

Centrifugal pump weighs 27 lb.

Construction Machinery Co., Waterloo, Iowa, has announced a small Pick-Up Pumper that weighs 27 lb. and can be used for such jobs as watering lawns and gardens, spraying weed killers and orchards, whitewashing buildings, and dewatering basements. It can be used as a booster where water pressure is low and since it is a self-priming centrifugal pump it can lift water by suction up to 25 ft. It is rubber cushion mounted, has a carrying handle, enclosed cooling fan, muffler, and is powered by a gasoline engine. It is priced at $98.00.

18-in. bar chain saw by Mall is $265

At 29 lb. and 3½ brake hp., the 1MG is the latest model chain saw offered by **Mall Tool Co.**, 7725 So. Chicago Ave., Chicago 19, Illinois. The stand-

ard cutting bar is 18 in. long, but lengths of 24, 30, 36, and 42 in. are also available. Swivel action through a full 360 deg. permits cutting at any angle with the engine held level.

Power comes from a single-cylinder, 2-cycle, air-cooled engine. Lubrication is by mixing oil with gasoline. Operation includes an automatic clutch that stops the chain when the engine idles.

Electronic batching system

A versatile electronic batching system is now available from **Thurman Machine Co.**, Scale Division, 156 No. 5th St., Columbus, Ohio. The new system is adaptable to either a cumulative or a consecutive weighing. The controls may be set to weigh one batch or for completely automatic continuous batching. In addition, controls may be set to weigh any specific number of batches. Thus, all materials in any formula can be automatically and accurately weighed and transferred from storage bins to mixers and processing machinery without handling or delays. Full details can be obtained from the manufacturer.

Steam cleaner improved

Faster steam cleaning on all types of cleaning work is claimed for an improved version of Model 250 high pressure combination cleaner manufactured by **Malsbary Mfg. Co.**, 845 92nd Ave., Oakland, Calif. The improved model produces pressures up to 300 psi. It uses a pump for pressure instead of steam. This feature enables the user to get 300 lb. of pressure without lighting the burner. Two valves on the control panel enable the operator to shift to any of

PORTABLE FEEDERS Increase Plant Efficiency

Above, 50'x36" KOLMAN Portable Conveyor-Screen Plant equipped with built-in feeder and wing walls. Owned by Pete Kiewit Sons' Co.

KOLMAN
COMPLETELY PORTABLE
CONVEYOR-SCREEN PLANT
CONVEYOR • SCREEN • TRAP • FEEDER

Cutaway view of Portable Feeder-Trap Combination

The complete plant ready for towing includes Feeder-Trap combination, Wing Walls and Vibrating Screen "folded under" conveyor

Reciprocating Plate Feeders Built into KOLMAN Portable Loading Traps

Now you can handle rough, rocky, abrasive material without fear of belt damage—you can be sure of a constant, regulated flow of material—you can enjoy all of the advantages of a feeder on a completely **portable** plant!

With the "built-in" feeder, both loading trap and plate feeder are entirely portable. Both are designed as an integral part of the portable conveyor and are easily moved with it at all times. Thus, the feeder remains in position on the move as well as on the job. The trap provides a complete cover for all working parts and is large enough to permit a man to enter on either side to service and adjust the feeder and conveyor tail section. The feeder is controlled by adjusting the length of stroke and angle of operation.

This new Portable Feeder-Trap Combination is now available on all Model 101 Heavy Duty KOLMAN Portable Conveyors. Loss of time in setting up, taking down, and moving a separate feeder and hopper is eliminated entirely. Your portable plant is ready for operation as soon as it reaches a new job.

Steel Wing Walls Also Portable

The Portable Trap can also be equipped with steel wing walls extending forward and up beyond the regular loading trap walls. This additional enclosure prevents loose gravel, earth or other material from working into the conveyor tail section and eliminates the need for building awkward walls of timbers and planks. The Wing Walls are permanently mounted and portable with the rest of the plant.

The Feeder-Trap Combination makes it possible to use the KOLMAN Portable Conveyor-Screen Plant with virtually any type of feeding device, including bulldozer, shovel, dragline or front end loader. Available with either single, double or triple-deck vibrating screen, it is a versatile plant for high production screening, too!

Get full details. Mail the coupon below for literature and prices.

SEND for FREE literature

KOLMAN Manufacturing Co.
5670 W. 12th St. Sioux Falls, S.D.

Send literature on following. Quote size or capacity if price desired.

Conveyors ( ) .....
Screens ( ) .....
Feeders ( ) .....
Name .....
Address .....
City .....

the five cleaning actions, high pressure steam, high pressure cold water, high pressure hot water, low pressure wet steam, and low pressure warm water. The gas-fired unit is stationary, the oil-fired units may be had in stationary, caster-mounted, or trailer-mounted models. Further literature is available.

Armco steel building

An improved Armco steel building is announced by **Armco Drainage & Metal Products, Inc.**, Middletown, Ohio. The 40-ft. clear span structure is said to provide economies of more than 10% over the previous model. The building has eave heights up to 20 ft. Multiplespan structures are available, making the total floor area to be enclosed virtually unlimited both as to width or length. Any number of 40-ft. clear spans may be obtained in the width and columns are spaced 20 or 32 ft. as required in the other direction.

New line of telescopic hoists

A new line of telescopic hoists and matching dump bodies for use on tandem axle trucks has been announced by **Galion Allsteel Body Co.**, Galion, Ohio. The new hoists feature forward mounting of telescopic cylinders. This relocation plus new design of subframes moves more body hoist and load weight forward onto the truck's front axle. As a result, as much as 1,500 lb. more payload can be carried without exceeding rear axle weight limits. Further information is given in catalog LL-103.

Wheel tractor with backhoe

Allis-Chalmers Manufacturing Co., Milwaukee 1, Wis., has expanded its line of industrial excavating and materials handling equipment by adding the Model WD-45 wheel tractor equipped with the Henry backhoe. Other attachments are also available for the WD-45. The unit is designed to efficiently perform the many smaller trenching and excavating jobs, as well as perform cleanup and maintenance. Literature is available.

Front-wheel drive unit

F. A. B. Manufacturing Co., 1249 87th St., Oakland 8, California, has developed a front-wheel drive for ½-, ¾-, and 1-ton pickups and 2-ton

trucks. According to the manufacturer, the Fabco drive will operate at any speed up to 60-65 mph., whether engaged or not. Turning radius remains the same as for the original chassis.

Pionjar rock drill is all in one piece

It weighs just 86 lb., fully equipped. It's a 2-cycle gasoline engine-driven rock drill that will go about 1 ft. per min. in medium-hard granite. Drilling equipment is available in two standard sets, one for depths to 4 ft., the other for up to 11½ ft.

The tool is completely self-contained—no hoses or cables. But you do have to keep supplies of gasoline and oil handy, of course. Incidentally, the engine includes a floatless carburetor that allows horizontal drilling, and even stopping 45 deg. above horizontal, according to **Stanco Manufacturing & Sales, Inc.**, 1931 Pontius St., Los Angeles 25, California.

The Pionjar can easily and quickly be switched for use as a breaker, and two chisel types are supplied.

New transit by Berger

Accuracy at a moderate price—that's the Polara, a 5½-in. transit for contractors and engineers now offered by **C. L. Berger & Sons, Inc.**, 37 Williams St., Boston 19, Mass.

The transit has a 10½-in., 22-power erecting telescope with internal focusing. The reticle has stadia lines at a fixed ratio of 1:100. A 5½-in. horizontal circle has double opposite verniers. Verticle circle has one double vernier. Verniers read to 1 min. of arc. The compass is graduated in ½-degrees and is adjustable for declination.

A Big Grader for Less Money

ADAMS "440"

A husky 100 hp. machine that offers a new value in the heavy-duty class

costs you less to own, less to operate

The Adams "440" is designed for owners who want heavy-duty capacity and performance, yet must keep a sharp eye on costs.

This powerful machine handles a wide range of heavy-duty applications: road construction and maintenance—bank sloping—ditch cutting—scarifying—sub-grading—road mixing—bull-dozing—snow plowing, etc.

Like all Adams Motor Graders, the "440" features an exclusive combination of time-saving and work-producing advantages: 8 Forward Speeds, up to 25 mph.—3 Creeper Speeds, ¼ to 1¾ mph.—4 Reverse Speeds, up to 13 mph. . . . plus Easy-Shifting Constant-Mesh Transmission—Dual Braking System—Rubber-Mounted Engine.

Ask your Adams dealer to demonstrate how the "440" can speed production and cut costs—*for you!*

ADAMS DIVISION, LeTourneau-Westinghouse Company, Indianapolis, Indiana

Easily handles all average road building

High-speed mixing and spreading of blacktop

See your local

ADAMS DEALER

CALIFORNIA DISTRIBUTORS

Eureka—Howard-Cooper Corp.
Fresno—Allied Equipment Company
Los Angeles—Crook Company
Oakland—Bay Cities Equipment, Inc.
Redding—Sullivan & Crowe Eqpt. Co.
Riverside—Braman-Dickerson Co.
Sacramento—Sacramento Valley Trac. Co.
Salinas—Farmers Mercantile Co.
San Diego—Southern Eqpt. & Sup
Santa Maria—Hanson Eqpt. Co.
Stockton—Grace
Stratford—Orton's Eqpt. Co.

DISTRIBUTORS ALSO IN Seattle and Spokane, Wash. . . . Portland, Eugene, Roseburg, Albany, Coquille and Central Point, Ore. . . . Denver, Colo. . . . Phoenix and Tucson, Ariz. . . . Billings, Missoula and Kalispell, Mont. . . . Boise and Pocatello, Idaho . . . Reno, Ne

Heavy-duty rotary drill for 6¼-in. holes down to 1,000 ft.

Davey Compressor Co., Kent, Ohio, has up-dated its Model M-8A rotary drill package for truck mounting. It is rated for holes up to 300-ft. depth with air, and 1,000 ft. with mud.

Power for the compressor and pump comes from a GMC-471 engine. The compressor is a Davey 500-cfm. unit. The mast is 30 ft. high, with sheaves 20 in. in diameter. The rig is designed for pulling 15-ft. drill section stems. It weighs about 20,000 lb.

Single-cylinder electric plants

Universal Motor Co., Oshkosh, Wisconsin, is now producing new models of AC and DC electric plants with capacities up to 2,200 watts. Lowered weight-per-watt is claimed —15% greater capacity and 60 lb. less weight.

The Model 42 series measures up like this: weight 270 lb., length 33 in., width 20 in., height 23 in. Power is supplied by a 4-cycle air-cooled engine. The generator is rated at 2,000-2,200 watts at 1,800 rpm.

Oil burner for plants up to 35 boiler hp.

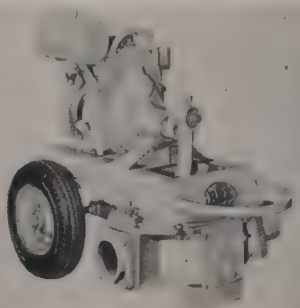
Cleaver-Brooks big Hev-E-Oil burners have been scaled down to the new "3" model, which retains all the main features of the bigger line. The burner is suited to installations having a net standing radiation of 3,800 sq. ft. or 35 boiler hp. Capacity of the burner has been upped 56% without increase in power consumption. It burns No. 4 or No. 5 heavy oil (up to 11 gal. per hr.) without preheating. **Cleaver-Brooks Co.**, 326 East Keefe St., Milwaukee 12, Wis.

Hydraulic hoist for pick-up truck bodies

The Galion Allsteel Body Co., Galion, Ohio, has a hoist for ½-, ¾-, and 1-ton truck bodies. According to Galion, the Model 334N will fit under any pick-up body, and also under platform bodies up to 9 ft. long. Capacity varies with the mounting, but rating of the hoist is 4 tons. It gives a dumping angle of 40 deg.

Diaphragm pump for high-solids use

The new Rex closed diaphragm pump is built for use where a centrifugal cannot be used because of high solids content. The 4-in. pump features straight-line flow for effective flushing all the time, and power by a Wisconsin 6.2-hp. engine. Note the big cleanout door for fast inspection.



For details on this unit, get in touch with **Chain-Belt Co.**, Milwaukee, Wisconsin.

What's new with Termite drills?

An improved line of rotary masonry drills has been announced by **Termite Drills, Inc.**, 99 No. Lotus Ave., Pasadena 8, California. Standard diameters range from 3/16-in. to 5-in.; 8-in. is available on special order.

Changing shanks—when going from one drill length to another—is easier because of a special collar added to Termite equipment. And all drills ⅞-in. and bigger have interchangeable shanks.

Termite drill lengths run to 36-in. The tools can be used with either standard electric or air motors.

Elevator for the Galion 503

Barnard & Leas Mfg. Co., Inc., P. O. Box 1787, Cedar Rapids, Iowa, announces the B & L elevating grader attachment. Designed for the Galion model 503 motor grader, this attachment is said to have the same features of larger models. A handy point is that it folds up for highway transport without special permit.

How to Solve Tough Conveyor Problems..

Call **YUBA**

Whether your problem is lifting wet, slippery loads over steep angles; conveying rock, sand or gravel; or moving heavy tonnages where pit and plant are widely separated —YUBA can help you.

YUBA-built conveyors range in size from very short to mile-long systems capable of transporting 17,000 tons daily. Designs are based on half century of experience building heavy-duty conveyors for placer dredges, aggregate producers and contractors.

Trouble-Saving Head Pulley

By using a YUBA-SCHROCK head pulley, the pulley with the motor inside, you save space, cut maintenance costs and avoid conveyor downtime. All the drive mechanism fits compactly inside the pulley shell, protected from weather and dirt. There are no chains, belts or sprockets to service, replace or endanger personnel. Sizes to 125 hp. for inclusion in new conveyors or for modernizing old conveyors.

Bring your hard-to-solve materials handling problems to YUBA. Let our knowledge help you work your property most profitably. For recommendations and estimates, call, wire or write YUBA Today.

81

Dredges • Hoists • Winches • Drums • Screens
Jigs • Hoppers • Bins • Drives and Shafting
Expansion Joints • Built-to-order Machinery

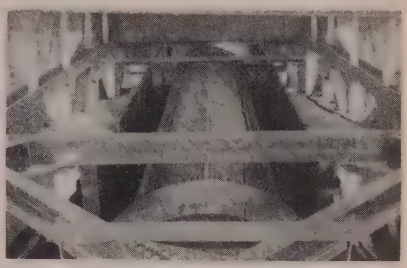
YUBA MANUFACTURING CO.

Room 732 , 351 California St., San Francisco 4, California, U. S. A.

AGENTS { SIME, DARBY & CO., LTD. · SINGAPORE, KUALA LUMPUR, PENANG.
{ SHAW DARBY & CO., LTD., 14 & 19 LEADENHALL ST., LONDON, E. C. 3.

CABLES: YUBAMAN, SAN FRANCISCO SHAWDARBCO, LONDON

YUBA Bucket Ladder Dredges for dredging placer properties including rare earths, etc.; handling sand and gravel, dam construction, channel changes, etc., Bucket sizes: 2½ to 18 cu. ft. or larger. Digging depths below water as required.



YUBA Abrasion Resisting Steel Screens—Flat or revolving for separating, scrubbing, sizing. Holes taper drilled to prevent clogging. All thicknesses from ¼" up; other dimensions as needed. U·S·S· AR plate carried in stock.

Stockton "Yubabilt" Clamshell Buckets, for channel, harbor and reclamation dredging. Two types: California and Power Arm (shown here). Three weight classes: heavy, standard, special light weight. ½ to 6 cu. yds.

57

YUBA MANUFACTURING CO.
Rm. 732, 351 California St., San Francisco 4, Cal.

News of DISTRIBUTORS

Merger for Wooldridge

From now on it's Wooldridge Division of Continental Copper & Steel Industries, Inc. First effect will be Eastern manufacturing and parts service for the Wooldridge line of self-propelled scrapers and other equipment. Also, the present Wooldridge plant at Sunnyvale, Calif., will serve as a Western extension for the other 7 existing divisions of Continental Copper & Steel.

Wooldridge is already in the tank and pressure vessel field. The other divisions it now joins produce these products: processing equipment, tool and die steels, wire screen, insulated wire and cable, non-ferrous alloys, boilers, and penstocks.

No personnel changes have been announced. Henry Gusman, Wooldridge president, remains in charge of the new Wooldridge Division.

Johns-Manville district managers

Joseph E. Kindregan, assistant Milwaukee district manager of Johns-Manville Building Products Division, has been appointed manager of the Division's Seattle district, succeeding Howard Anawalt, resigned. Owen G. McKinney, senior sales representative for the Division in southern and western Colorado, succeeds Kindregan at Milwaukee.

New warehouse for Carver pumps

Carver Pump Co. is now warehousing pumps on the West Coast to assure prompt deliveries and service. Location of the warehouse is at 1530 W. Twelfth St., Long Beach, Calif.

Philpott adds two men, three lines

Two new sales engineers have been added by George M. Philpott Co. of Portland, Ore., namely, R. L. Hendersen and Roy K. Farris. Also, three new lines were recently taken on: Dart Manufacturing & Sales Co., Newman Industries, and Cullman Wheel Co.

Schramm appoints

Tom Bono recently joined the staff of Schramm, Inc., as sales engineer at the Los Angeles branch. Bono has had a wide background with the rock drilling and pneumatic tool industry.

Hensley appoints

Hensley Equipment Co., Oakland, Calif., manufacturer of dozer and scraper attachments and cutting edges, recently named three exclusive dealers in the California area: Holz Company, Ukiah; Westside Tractor & Equipment Co., Willows; and Emerson Braden Co., Colusa.

Rilco opens Western office

Rilco Laminated Products, Inc., manufacturer of glued laminated wood and solid timber structural members, recently expanded its sales activity to include the West Coast. R. A. Glaze has been chosen to head the new Western office, and assisting him as sales engineer will be Robert E. Eby. Sales offices will be in the Tacoma Building, Tacoma, Wash.

Lingenfelter appointed Western rep.

Ben E. Lingenfelter of Salt Lake City, Utah, has been appointed as Western district representative for the Buffalo-Springfield Roller Co. He

Ben E. Lingenfelter

will represent the complete line of Buffalo-Springfield road-roller compaction equipment in states west of the Mississippi.

Butte Machinery Co.

Butte Machinery Co., Butte, Mont., recently took on the line of the Gustin Bacon Manufacturing Co., producer of pipe coupling equipment.

American Chain & Cable opens Portland branch

American Chain & Cable Co. has a new branch office at Portland, Ore., and a warehouse also. Irv Schobert is wire rope sales representative for the Northwest.

Peacor appointed regional mgr.

Appointment of Harry G. Peacor of Portland as regional manager for All-State Welding Alloys Co., Inc., was recently announced. Peacor will be responsible for sales and service in Oregon, Washington, Idaho, Wyoming, Montana, northern California, and western Canada.

Electric Tool & Supply Co.

Electric Tool & Supply Co. of Los Angeles was recently appointed distributor for TerraTrac crawler tractors and attachments for the southern half of California. Appointments and organization of local dealerships in the area will be handled by Bert Freer, general sales manager. Also announced is the formation of a new corporation, Santa Fe Equipment Co., Inc., which is operating as an affiliate of Electric Tool & Supply, at the same headquarters and under the same personnel. Basically this new company will sell and service all heavy equipment lines and allied products. Two major accounts are The Thew Shovel Co. and The Huber Manufacturing Co.

Snap-Tite, Inc.

The Rucker Co. has been appointed as Western distributor for the Snap-Tite line of couplings.

Hatten additions

Hatten Machinery Co., Seattle, recently took on the CMC (Construction Machinery Co.) line, and Pitman Giraffe, and added to its staff two new salesmen: Stephen R. Zorro and Robert W. Reynolds.

New dealers for G.M. diesels

Lively Equipment Co. of Albuquerque, New Mex., and Western Tractor & Equipment Co. of Seattle, have been appointed authorized dealers for General Motors Detroit Diesel Engines in Euclid earthmoving equipment.

Pioneer appoints

Western Machinery Co., San Francisco, has been appointed a distributor in the state of Arizona for Pioneer Engineering Works, Inc. They will carry a complete line of Pioneer Continuflo equipment.

Soule' Steel news

To provide local service to Utah architects, buildings, and contractors, the Soule' Steel Co. has opened a sales headquarters in Salt Lake City. Located at 220 Greyhound Bldg., the sales office is under the management of Kenneth Archer, formerly sales engineer at the Los Angeles plant. Other news from Soule' headquarters is the appointment of T. O. Carroll as district manager at Portland, Ore., succeeding E. W. Hussy, who died a few months ago. Carroll had been a sales engineer in the San Francisco office for the last eight years.

The Mole

West Coast Industrial Sales Co., San Francisco, recently announced the availability of the Mole drilling machine on a rental basis. According to J. F. Hamlin, president of the firm, the machine can drill through combined substances of concrete and steel reinforcing bars, granite, and terrazzo tile, and weighs only 175 lb.

Fresno branch for Philpott

George M. Philpott Equipment Co., dealer for Euclid and other con-

Ice, Sleet, Snow—*SLOW!*

Check the looks!

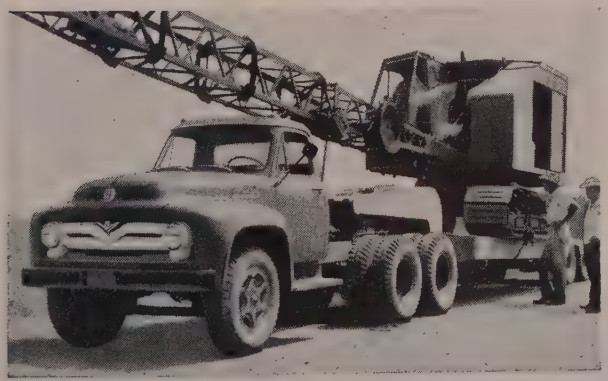
Try the comfort!

Then, to get the most for your money

LOOK UNDER THE HOOD!

A revolution in truck power is taking place . . . sparked by the Ford Short-Stroke V-8!

When a new type of engine prolongs piston ring life as much as 53% . . . gives gas savings of up to 1 gallon in 7 . . . cuts engine friction as much as 33% to liberate more *usable hauling power*, you know it's bound to go over big with economy-minded truck users.



A new MONEY MAKER for heavy construction work—the '55 Ford T-800 Tandem Axle BIG JOB! Powered by the mighty Short-Stroke 170-h.p. *Cargo King* V-8, it is rated for 40,000 lbs. GVW, 60,000 lbs. GCW. *Master-Guide* Power Steering is standard equipment!

Small wonder, then, that the truck industry is now investing millions of dollars *under the hood* . . . in a revolutionary switch to Short-Stroke V-8's.

But Ford, pioneer in V-8 truck power, made the switch over three years ago. And right *now*, you'll find a *proven*, modern Short-Stroke engine under the hood of every Ford Truck. Only Ford offers a full line of Short-Stroke engines . . . four V-8's and a Six.

Make sure your next truck is a modern Money Maker. Look *under the hood!* Look for a modern Short-Stroke engine with a "stroke" as short as, or shorter than its "bore." And remember, you get the full advantages of Short-Stroke design *today* in any Ford Truck you choose.

Call your Ford Dealer or write: Ford Division, Ford Motor Co., Dept. T-78, Box 658, Dearborn, Mich.

FORD Triple Economy TRUCKS

THE MONEY MAKERS FOR '55

struction equipment in California, has opened a new branch office at 2376 South Railroad Ave. in Fresno. James Meehan is manager of the new branch. He was formerly service manager at the San Francisco headquarters of the company.

New outlet for Homelite

Robert C. Glidden, district manager for Homelite Corporation, San Francisco, recently announced appointment of Sierra Machinery Co., Reno, Nev., as its new outlet in that area for the Homelite-Bosch line of tools, including electric rock drills, pumps, and generators.

Andrews Machinery handles English line

Andrews Machinery Co., Seattle, Wash., has recently taken on a direct factory distributorship of "Cumflow" mixers, which are manufactured in England by the Liner Concrete Machinery Co., Ltd.

Cook receives two new distributorships

Cook Brothers Equipment Co. was recently appointed to represent the C. S. Johnson line of concrete batching and cement handling equipment in Central and Northern California, and will maintain an office at 444 Eighth St. in San Francisco. The Los Angeles sales office of the company recently took on the distributorship for the products of the Schield Bantam Co. for all of Southern California, except San Diego and Imperial counties.

Mack Motor adds a distributor

Effective in December, Mack Motor Truck Corp. appointed a new distributor to handle its equipment in the Arcata (Calif.) territory. This distributorship will operate under the name of Redwood Mack Sales, Inc., and will have sales and service facilities at 3598 Alliance Road in Arcata.

Caterpillar establishes new depot

Caterpillar Tractor Co. has established a new parts depot in Los Angeles to provide emergency overnight service to its distributors in Southern California, southern Nevada, and Arizona. James Busey has moved out from St. Paul to become manager of the new depot. He will be assisted by Robert Webster.

Gradall outlet at Phoenix

State Tractor Co., 407 South 17th Ave., Phoenix, Ariz., was recently appointed to handle the products of the Gradall Division — Warner & Swasey Co. in that territory.

Spokane Kenworth appointment

Spokane Kenworth Co., distributor for Kenworth Motor Truck Corp., has recently named John Brundige as parts manager, replacing Harold Taylor. The company handles Hall-Scott engines, as well as all miscellaneous truck parts.

New Arizona distributor

Appointment of the newly organized Min-A-Con Equipment Co. of Phoenix, Ariz., as distributor for General Motors diesel engines throughout Arizona, was recently announced by the Detroit Diesel Engine Division of GM. Heading the new company are L. W. Beck, H. H. Hall and C. C. Sons.

News from Lincoln

Lincoln Electric Co., Seattle, Wash., recently moved into a new building at 543 West Nevada, where it has larger quarters, with more warehouse space and a large demonstration room for holding welding clinics, etc. A new salesman has also been recently added: Gerald E. Weiland, whose territory embraces northwestern and eastern Washington. The company has also appointed three new distributors for Washington: Ulin Maintenance & Supply at Forks, with a branch in Port Angeles; Lincoln Mutual No. 1 at Almira; and Donald A. Nichols, Okanogan.

Rucker appoints Miller at Portland

Lynn T. Miller has been appointed to direct the operation of the new office and warehouse facilities established in Portland, Ore., by The Rucker Company of Oakland, Calif. The appointment of Miller extends the direct sales and service coverage throughout the entire Western area. The new Portland office is located at 911 N.W. Hoyt St.

New Northwest sales mgr.

Robert P. Brooks was recently appointed Northwestern sales manager for Bucyrus-Erie Co. at Seattle, succeeding Charles W. Buehler.

MANUFACTURERS

Kaiser Steel

Alan G. Grey has been appointed manager of structural and bar sales at Kaiser Steel Corp., making his headquarters at Oakland, Calif.

Heil consolidation

Harlan Stoller, former export and government sales manager of The Heil Co., is now director of government, export, and road machinery sales, responsible for over-all direction of the department. Appointed sales manager of this newly consolidated department is Paul Miller, who was sales manager of the former road machinery division.

New v.p. of sales-manufacturing

The McKay Company recently appointed Fred A. Kaufman as vice president in charge of sales and manufacturing, with headquarters at the company's executive offices in Pittsburgh. Prior to his present appointment, Kaufman was general sales manager of all McKay products, including commercial and industrial chain, tire chains, and arc welding electrodes.

Woodley

Penkoff

Charles Woodley made v.p.

Election of Charles A. Woodley as a vice president of Caterpillar Tractor Co. was recently announced. In his new capacity Woodley will give administrative direction to the six Caterpillar plants located in the United States, including that at San Leandro, Calif. Lloyd J. Ely, Peoria, succeeds Woodley as manager of the Peoria plant. W. O. Bates, Jr., will continue to have administrative responsibility at San Leandro.

Galion appointed

The Galion Iron Works & Mfg Co. has appointed Daniel Penkoff as southwestern district representative on motor grades and rollers. His territory includes California, Arizona, Nevada, Colorado, New Mexico, and southwestern Texas. W. A. Beale, formerly district representative for the Southwest territory, has returned to the main office.

Chapman Valve fills v.p. post

Ernest Cochran, formerly executive vice president, was recently elected to the office of president and general manager of The Chapman Valve Manufacturing Co., succeeding John J. Duggan, recently deceased. Cochran has been connected with the Chapman organization since 1916.

Worthington officers

Walther F. Feldmann, vice president in charge of sales of Worthington Corporation for the past four years, became executive vice president effective January 1, succeeding Edwin J. Schwanhausser who became president of the corporation. Former president Hobart C. Ramsey became chairman of the board. Thomas J. Kehane, succeeds Feldmann as vice president in charge of sales.

Bethlehem Pacific

T. E. Gillen, actively engaged in steel industry work in the Northwest since 1920, has been appointed chief engineer of Bethlehem Pacific's Seattle steel plant, according to C. H. Beattie, general superintendent.

ADVERTISERS in this issue

BACKFILL, uncompacted

There ought to be a use for it

The B. F. Goodrich people have come up with an unusual hose design for the mining industry. Just maybe there'll be construction applications too.

It's rubber hose good for water pressures of 250 psi. It's spiral-wire-reinforced, and built with the toughest possible lining for handling ore, or sand and gravel, or metal chips... or anything abrasive. Diameters go from 1 to 14 in.

Goodrich has tested "Convertapipe," as they call it, and happily announce that 10-lb. chunks of coal, and pieces up to 8 in. long don't bother it a bit. It's especially handy on sharp corners, where abrasion is the worst and pipe more expensive.

Now, this makes us think of all the fancy precautions taken on dam jobs these days, to hold down temperatures of aggregates, water, and concrete itself. On some jobs where the summers are hot, whole systems of conveyor belts have been enclosed to keep the sun off the rock. Maybe it would work out to move aggregates through special hose like this, with water as the transporting and cooling medium. There are pumps that would do the trick. Now there's a hose. What about the dollar signs?

Well, that spillway is pretty steep!

As quoted in Spokane recently, a British Columbia member of parliament has announced that Grand Coulee Dam is a treaty violator. According to H. W. Herridge, there was an Oregon boundary treaty 'way back in 1846 that had a clause on Columbia River navigation. In partivular, it reserved to Canada a right to use the Columbia for shipping.

Now we have gone and built Grand Coulee, which pretty effectively plugs the main stem, although navigation on the lower river, and on the Snake, is carefully being preserved. Whether seriously or not, Herridge voiced the opinion that Canada should have been consulted, and it certainly should have been compensated under the treaty provisions.

The Grand Coulee situation, one might say, is water over the dam! But whatever the merit of Herridge's remarks, they certainly point up the fact that basin-wide decisions are the only way to effective use of such resources as the Columbia. And they amount to a left-handed compliment for the recent seven-state Columbia compact.

This time "S.I." means Simple Inquiry

We keep hearing the phrase "S.I." It's loosely used as a tag for the self-made civil engineer, usually an older fellow who started out by cutting brush on railroad or hydro surveys 40-odd years back. Chances are he never did get formal engineering education, but developed the invaluable art of judgment in the field, perhaps with a boost from correspondence courses.

But now the question is: What does "S.I." really stand for? We've always gone along with an explanation that amounted to a friendly wisecrack at the men called S.I.'s. Lacking a formal education, and maybe not knowing how to spell too well, they are Sivil Ingineers. S.I.'s.

But now a new thought has come along. S.I.'s all got their start in surveys. And the bible for that work, especially on railroad grades and curves, was the well-known handbook by Searles & Ives. According to this story, such a surveyor was an "S. & I. engineer," or just plain "S.I.".

What we need now is for some S.I. to set us straight. This is just a Simple Inquiry.

Twenty-five years ago in *Western Construction*

"A mobile asphalt paving plant designed to handle 1,000-lb. batches at 1¼-min. intervals, but capable of mixing batches up to 1,500 lb. each, is announced by the **Madsen Iron Works** of Huntington Park, Calif. The plant is the 1,000-lb. size which this company has been building for 10 yr., redesigned to secure complete portability."

* * *

"A maximum production of 1,101.2 tons of asphalt concrete in 8 hr. and a daily average of 802 tons for the entire job of 40,104 tons, is a new record on state highway construction in California, and probably establishes a national record. This production was obtained on 10.5 mi. of U.S. 101 in Monterey County, between Salinas and Chualar, Calif.

"The contract was awarded to **Peninsula Paving Co.** of San Francisco for $236,484. The price for the asphalt concrete was $4.27 per ton, which covered all items from permanent wood forms to rolling.

"J. C. Miles, general superintendent, was in complete charge, and Jack Logan, superintendent of plants, gave his entire time to this job. Inspection for the state was conducted by C. E. Schultz, resident engineer; E. D. Davis, street inspector, and J. M. Chaffe, plant inspector."

* * *

"**A. H. Read Co.,** of Cheyenne, Wyoming, will complete contract about August 1, 1930, for construction of North Crow Dam for the city of Cheyenne, located 29 mi. northwest of the city. The dam is earth and rock fill type, 90 ft. high."

* * *

"**Clarence Winnett,** for 6 yr. in the engineering department of Columbia County, Washington, has been appointed as county engineer.

"**Henry Canty** has been appointed county engineer of Mason County, Washington, succeeding **W. H. Wiley,** resigned.

"**Charles H. Williams,** for 9 yr. an assistant district engineer in the Washington Department of Highways, at Chehalis, has been appointed city engineer of Olympia, succeeding **Charles I. Singer.**

NEXT MONTH

CONDUITS—TWO KINDS. One of them is small and had to be dug in, 'way up north. The other one is bigger (but not big enough, it sometimes seemed), and they had to dig it out, 'way down south. We're talking about . . .

THE ALCANGO PIPELINE. That's the one up north. You've read this month how they designed 621 mi. of trouble. Part 2 of our report on this job covers the important part—building it.

TECOLOTE TUNNEL. They had a holing-through party down south late in January. We don't figure to start a society page in **Western Construction,** but we won't do badly to note the victory celebration that followed holing through on this notorious project.

. . . The Editors

Editorials

"Lit" to serve your needs

Things are looking up for you contractors, in one respect for sure. We're thinking, as editors, of the special news material put before you each month in **Western Construction's** editorial departments known as "New Literature" and "New Equipment."

For a long time we have thought that some manufacturers' literature shows more expense for color than for thought. And the color is used both in the ink and in the wording. The big, one-sheet folder just doesn't say much. It's a "name" reminder—and maybe a rug!—but not much more.

Now, however, we see some real fine stuff. We see "lit" that shows a real interest by manufacturers in the problems of their customers. We see performance data by the dynamometer instead of by "how Root & Hall are doing it" on their job! (In another state, at another altitude, in different soil!)

One company has issued a brochure that points out new fields of activity for owners of its line of equipment. To the many one-man-band operators of bulldozers it says, "Farm work can be a good source of income." And it follows up with tips on terracing and ditching, digging ponds, knocking down trees and stumps, clearing stones, and doing grading and leveling.

Another company is in with tips on the care and maintenance of off-highway tires. Naturally, their own rigs run on rubber. But it's nice to have them realize that tires cost money and rate good care too.

We believe these examples are straws in the wind for future product literature, but it's up to you to prove us right or wrong. Literature is service. You and your equipment are what need it. It's your decision how it is served up.

Machinery—hydroelectric vs. political

The second rejection of bids for machinery at The Dalles Dam confirms all doubts. There's a skunk somewhere, for sure, and his tail is 'way up in the air. We can tell by the smell.

In both cases of machinery bidding for The Dalles, the low bidder was a foreign supplier, competing against stiff "Buy American" criteria that required him to get at least 25% under domestic bidders. Official excuse for the latest rejection is that re-examination of the specifications (after the opening) revealed ambiguities and requirements that made full compliance difficult and uneconomic. For anyone with even a reasonably generous and tolerant view of the technical capabilities of the Corps of Engineers, this is hard to believe. The Corps has been specifying and purchasing generating equipment for too many years to suffer such a lapse now.

Competitive bidding was set up to protect the public —presumably to protect the public from arbitrary or otherwise motivated favoritism in awarding contracts for public works. The bidding on The Dalles Dam generators appears not to have protected the public. It appears by manipulation to have protected the bidders —at least, some of them.

But perhaps, according to some political criteria, the public interest is at stake. If, for possibly very good political reasons, it is not desired to entertain foreign bids, then they should be ruled out in the bid call. They certainly should not be cast out by rejection after the bid opening, by means of phoney devices.

Our concern is not the welfare of any bidder, nor the Army, nor the public funds involved. Our concern is the entire structure and tradition of competitive bidding. Ill-considered actions of the current stripe could have disastrous effects right on down the line in public works —to the $8,000 muncipal alley award.

The real truth of what lies behind The Dalles rejection is well illustrated by an incident some years ago, before the bidding on machinery for Chief Joseph powerhouse. A prospective English bidder (who ultimately withdrew his bid before the opening) made a statement that indicated his realization of the hazard before his firm. They weren't concerned about compliance with the specifications. They made no added guarantee relative to the quality of work contemplated.

As Colonel Itschner, then North Pacific Division Engineer, later recounted it in a speech, the prospective bidder simply stated "that they were going to insert a proviso by which the British government would guarantee to purchase an equivalent value of apples if they were successful."