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FEATURED THIS ISSUE

Hard hats vs. wilderness:
Part I of the Alcan Story

Supervising for profits
on major building jobs

Vibrator life up 4 times
with smart maintenance

Advances in the use of
light steel bridge decks

COVER: It's a transmission
tower? . . . (see page 4)

NOVEMBER 1953

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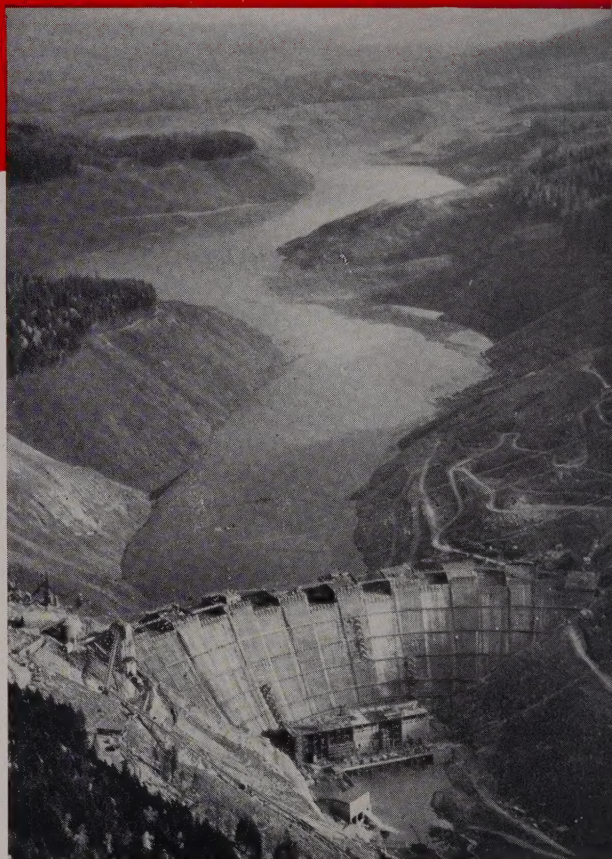
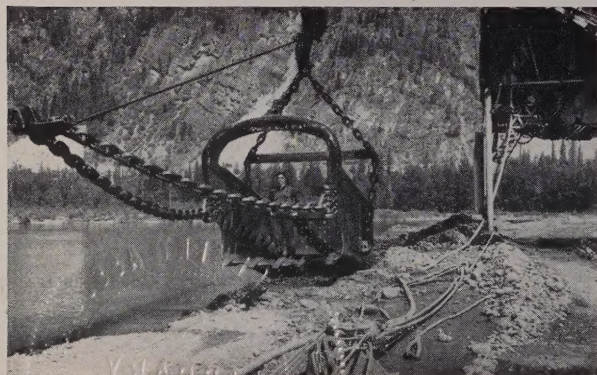
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WESTERN

CONSTRUCTION

Volume 28

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FRONT COVER

IT IS A TRANSMISSION LINE TOWER, a new type introduced on the fabulous Alcan Project in British Columbia. The towers are tubular aluminum, and are installed for a single-circuit line reaching from the project's big underground powerhouse 50 mi. to the aluminum smelter site. The entire Alcan Project is being described in this and the next three issues of *Western Construction*. First installment begins on page 66; a later installment will cover transmission line work.

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Published Monthly by
KING PUBLICATIONS

609 Mission Street
San Francisco 5, Calif.
Telephone YUkon 2-4343

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The annual subscription rate is \$4
in the United States and countries
in the Pan American Postal Union.
All other countries, \$5 per year.
Single Copies, 35¢

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609 Mission St., San Francisco 5,
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Freeways are not providing the answer

Behind the enthusiasm for planning and building freeways to solve urban traffic problems is the growing suspicion that the basic concept should have a re-appraisal, particularly with reference to cities of moderate size. As millions of dollars are poured into these super highways, it is more and more evident that they are not solving the problem. The outstanding modern example of freeways built to reduce traffic congestion and municipal stagnation is Los Angeles, and there the problem has been expanded rather than reduced. In some measure this plight has been caused by the rapid growth of that remarkable metropolitan area. On the other hand, there is the possibility that freeways generate traffic as fast as they are built, leaving the basic problem unsolved.

Five years ago any modern city in the West faced with an average amount of traffic congestion, based on current population and anticipated growth, was eager to start freeway construction. The urge was based partly on a desire to keep up with the modern style and partly on the supposition that costs would be justified by relief of the traffic problem.

The normal program was to provide a high-speed express way bringing major highway routes into the business center. But too little thought was given to means for disposal of this tremendous increase in traffic. Thus, in many ways the "solution" only tended to aggravate the original problem. The additional vehicles now funneling into downtown streets and the pyramiding parking problem combine to depreciate the value of the freeway. Arterials and widened streets needed to get traffic on and off the freeway may represent a secondary cost equaling the original.

By comparison, improvement of several major routes into a medium-sized city, together with establishment of a grid system of arterial streets and corresponding public parking facilities, might represent a lower total cost and a more practical solution. The flow of traffic over such a larger pattern of streets might be characterized by reduced speed for the individual vehicle, as compared to travel on a freeway. But the concentration of congestion would be reduced and the average time to reach destination would be lessened for the bulk of the traffic. For those cities now considering freeways as a solution to their current traffic problems, a "cooling off" period is justified, both for study of the success of existing urban freeways and for re-study of the local problems.

AED and the engineering "family"

Civil engineers and designers of earthmoving equipment must share the credit for advancing the structural use of natural materials in this century. At first glance, it is the increased capacity, a function both of sheer size and of higher operating speed, of earthmoving units that has made possible a steady reduction in the cost of embankment. But, though this material in place became potentially cheaper (at least by comparison to others) through equipment developments, its actual economies are the result of civil engineering efforts. And, while designing for greater heights and volumes, engineers have stimulated still further research in economical earthwork.

Though alternating between manufacturing plant and engineering laboratory, these developments in equipment and in the science of soils provide continuing evidence of the practical mating of engineering and equipment interests. But their union has not been characterized alone by their separate, though reciprocally fostered, developments. They have at the same time spawned a third development, an expanded market for earthmoving equipment itself. And in the West this is a mighty big "baby"!

The story is the same for other classifications of construction equipment. In fact, the "family" of markets long ago grew so large as to require the services of a special guardian. And so the construction equipment distributor joined the family.

His function has continued to be a singular and important one in the engineering construction field. And his own organization, the Associated Equipment Distributors, has served the construction industry well. In working for its members over the years, in performing its own, major part in the development of construction equipment markets, AED has well won its place in the family and demonstrated its competence in "the care and feeding" of the lusty infant!

Engineering eggs and chickens

How civil engineering and manufacturing people match each other in ingenuity is shown by three articles in this issue. On pages 59-62 is an example of engineering technology being applied to improving steel bridge design. The versatile drill rig pictured on pages 76 and 77 is a manufacturing development that answers a specific engineering need in the field. Sometimes the men in the field tackle a problem independently. What the contractor at Folsom Dam did to make a better concrete vibrator is revealed on pages 74 and 75. In this case the manufacturer was last in line . . . but went home nodding his head in agreement.

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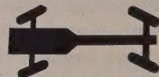
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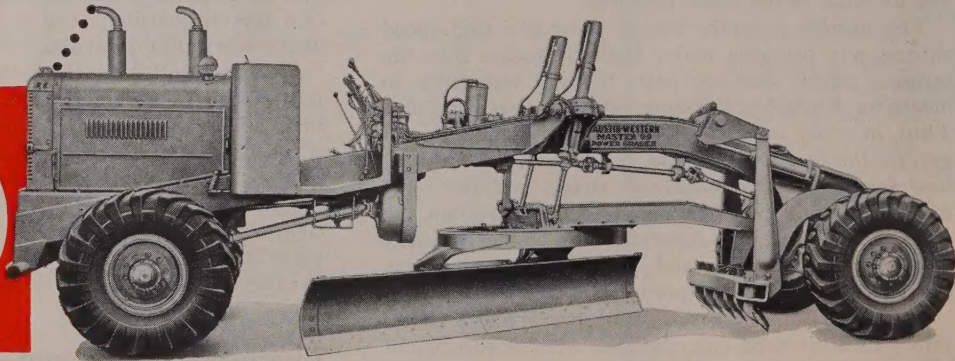


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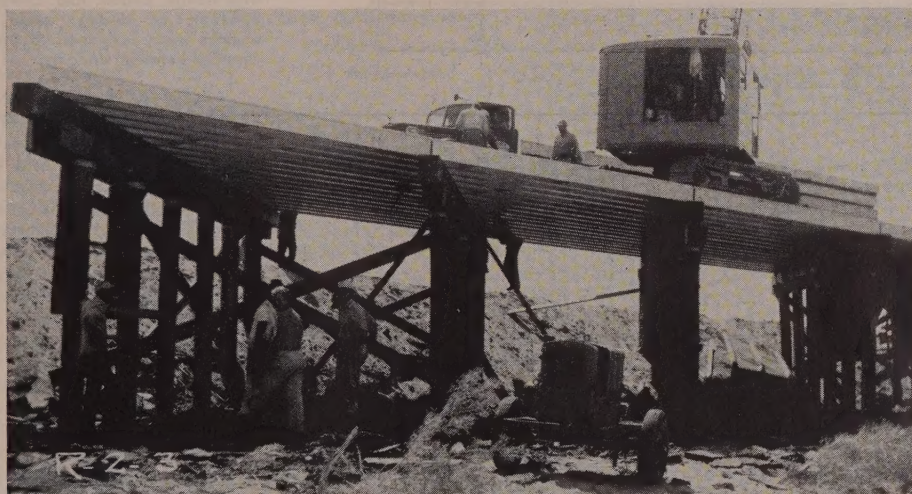
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NOVEMBER 1953

California field experiments promise new uses for —

THE LIGHT STEEL BRIDGE DECK



Erection of prefab deck sections (above) is quick and simple for the "battle-deck" bridge; provision of adequate wearing surface has been the problem — Service records of two bridges show 2- to 4-in. plantmix holds up well but $\frac{1}{4}$ in. of latex-asphalt may be best all-around

ONE of the problems of the California Division of Highways has been redecking several hundred timber-trestle bridges in the desert regions of Imperial, Riverside, and San Bernardino counties. In past years this work was done quite economically by detouring traffic and replacing the 5½-in. timber floor with a ½-in. reinforced-concrete slab, using sheet metal forms placed on top of the timber stringers.

In an effort to solve the problems of greatly increased traffic and consequent high costs of detours in the post-war period, the Bridge Department made several studies of prefabricated deck units which could have been manufactured in nearby towns or rail stations, trucked to the bridge site, and placed under traffic. None of

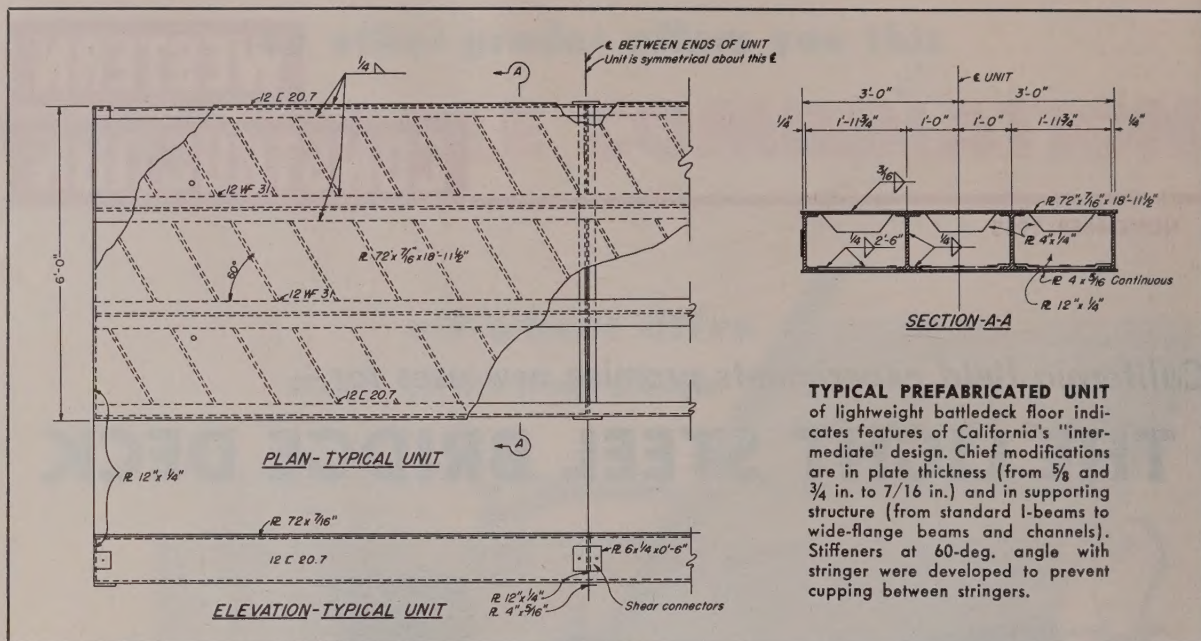
By
C. H. DARBY
Senior Bridge
Engineer
California Division
of Highways



these studies showed any appreciable economy over conventional design. Due to steel shortages, most of the schemes developed were for precast concrete, but because the units were too heavy for light mobile equipment, transportation and erection costs offset the advantages of prefabrication.

Previous studies of structural-steel deck units were based on use of a reinforced-concrete slab or of the heavy steel-plate floor described in the AISC pamphlet, "The Battledeck Floor for Highway Bridges," published in 1938. Comparison of this deck with some of the light-steel construction used during World War II indicated the need of a more thorough study of steel-plate floors for highway traffic. The objective of the studies was to establish a basis for design of steel deck plates between expendable wartime products with a small margin of safety and the conservative prewar floor plate which was too heavy to be competitive with other materials in the post-war economy.

The battledeck floor developed before 1938 was composed of heavy



TYPICAL PREFABRICATED UNIT

of lightweight battledeck floor indicates features of California's "intermediate" design. Chief modifications are in plate thickness (from $\frac{5}{8}$ and $\frac{3}{4}$ in. to $\frac{7}{16}$ in.) and in supporting structure (from standard I-beams to wide-flange beams and channels). Stiffeners at 60-deg. angle with stringer were developed to prevent cupping between stringers.

plates supported by standard I-beams. The plates varied from $\frac{5}{8}$ to $\frac{3}{4}$ in. thick. The total weight of the structure varied from 55 to 60 lb. per sq. ft. of roadway for span lengths of 17 to 26 ft.

New design approach

The intermediate design, made in 1947, is composed of a stiffened $\frac{7}{16}$ -in. plate supported by wide-flange beams and channels. The stiffeners are $4 \times \frac{1}{4}$ -in. plates at 14-in. centers set at 60 deg. with the stringer and welded to the flood plate only. The arrangement of stiffeners was developed to eliminate cupping of the floor plates between stringers; while they have been analyzed for flexural stresses, their principal purpose is to maintain a minimum deflection of $\frac{1}{800}$ of the unsupported length of plate between beam flanges. The weight of this design is from 30 to 40 lb. per sq. ft. of roadway for spans of 19 to 37 ft.

The most questioned phase of the battledeck floor design was an adequate wearing surface. Some states had used checkered floor plate in pre-war construction, but this had proven too hazardous for highway conditions; frost, ice, oil, and dirt render the raised pattern practically useless for traction. Asphaltic or bituminous pavements from $\frac{1}{2}$ to 3 in. had been used on some installations, but the life history of these wearing surfaces was not available for the studies. Because the deflection-span ratio of all components was being maintained at less than $\frac{1}{800}$, there would be little danger of cracking from flexure in cold weather so there was no hesitancy in specifying a thick, bituminous wearing surface for the first bridge of this type to be designed.

While the thick wearing surface is entirely satisfactory for short-span bridges, it would not be desirable for long-span bridges on which the weight varies from 25 to 50 lb. per sq. ft. One of the most promising uses of the lightweight battledeck floor may be for redecking and renovating long-span structures, and for this purpose a thin, elastic wearing surface is an important requirement.

Into the laboratory

The California Division of Highways Materials and Research Department has been doing experimental work with a binder composed of emulsion of natural rubber latex and asphalt since 1938. This work was undertaken primarily to develop a durable elastic filler material for expansion joints in pavements and bridge decks.

In previous years, the Bridge Department was concerned with the life and performance of laminated-timber bridge decks and asked the laboratory for suggestions to provide a curable water-proof coating. This problem was especially acute on bascule bridge structures where weight must be maintained at a minimum and also where any surfacing material must remain in place where the bascule span is elevated. The laboratory suggested the possibility of using a rubber latex-asphalt joint-filling material to construct a thin wearing surface in the hope that it would permanently seal the cracks in the timber deck.

Latex-asphalt mix tested

In May of 1947, a wearing surface approximately $\frac{1}{4}$ in. thick was applied to the timber deck on a bascule span using the latex-asphalt emul-

sion as a binder and $\frac{3}{8}$ -in. crushed rock as an armor coat. Some of the materials were unintentionally placed on an exposed steel-beam flange along the center line of the roadway. When examined one year later, this material had remarkable adhesion to the steel, a high elasticity, and good wearing qualities.

This incident caused the Bridge Department and laboratory engineers to consider the possibility of developing a very thin, non-skid wearing surface with these materials for use on steel floors on long-span bridges. Rubber latex and asphalt mixtures were subjected to a series of small scale experiments. Trials were made in the laboratory to determine rate of hardening and conditions necessary to control moisture dissipation from the emulsion. Small steel panels were coated with different formulas of latex-asphalt binder and screenings and placed in a heavily traveled alleyway.

First application

In addition to the ordinary traffic, these armored steel plates were further tested by locking the brakes of small trucks and causing the vehicles to skid across the specimen. The favorable results from these tests contributed to the design of the second battledeck structure to be built by the California Division of Highways.

The first use of this type construction by the Department was redecking the Smoky Gulch Bridge on U. S. Highway 70, east of Indio in Riverside County. This bridge is a 230-ft. timber trestle of twelve 19-ft. spans on a 45-deg. skew with a timber deck and bituminous wearing surface. The wearing surface and deck had been

repaired so many times that further maintenance was not warranted. The caps and piling, however, were in good condition with an estimated additional life of 20 yr., so replacement of the superstructure with prefabricated steel deck units was authorized.

Fabrication and erection

Fabrication and erection of these deck units were complicated by the 45-deg. skew angle and a steep grade line on a vertical curve which varied from 4 to 6%. The sections were fabricated in 7-ft. widths and painted in the shop, including the final coats. Dismantling of the old bridge started March 1, 1950, and the substructure work was completed March 17. Delivery of steel started March 20. Erection started March 21 and was completed March 23, except for miscellaneous bolting and placing of rail posts, which required two more days. The move out was made March 27. The bridge was opened to traffic April 17, 1½ months after it was closed. An "all-concrete" bridge in this same contract, which had 24-ft. slab spans and was 280 ft. long, required 1½ months for substructure work, 2 months for the superstructure, and 21 days for curing, or a total elapsed time of 4 months and 20 days.

"Like a cut-out puzzle"

Some simplification of the erection was made by keeping the tops of the steel plates level in cross section and varying the thickness of surfacing for roadway crown, but due to the skew and steep grade the work proceeded more slowly than the erector had planned. To quote the resident engineer, "Each piece had to be fitted as carefully as blocks in a cut-out puzzle." The only lifting equipment required for erection was one P & H crawler crane, rated at 1 cu. yd. capacity and equipped with a 40-ft. boom. The operation was quite simple, since units were removed directly from the delivery truck to the bridge and the equipment moved onto each newly-placed span without delay from any cause.

Surfacing characteristics

The plant-mix wearing surface was placed 2 days after the erection crew moved out. A 2-in. bar had been welded to the deck on each side of the pavement for a header. An emulsified asphalt-paint binder was spread over the steel deck with a spreading machine, and plant-mix surfacing was placed from a Miller spreader box, hand raked, and rolled with a 2-ton roller. The pavement was 2 in. thick at the edge and 4 in. thick at the center line. Several truck loads of overheated material had to be removed and the holes patched. The entire deck was then sealed with emulsified asphalt and sanded.

The resulting surface has given ex-

cellent service since; the only imperfections noted in three annual maintenance inspections were slight contraction cracks in the wearing surface over the transverse deck joints at the bents in two cases and bulging of wearing surface over some of these joints in the third inspection. This is a much better service record than for the timber deck. The first maintenance on the old timber bridge, 4 yr. after construction, states the wearing surface "has had careful maintenance." Each subsequent report recommended further patching or resurfacing. The large number of heavy trucks using this bridge gives the best idea of the wear to which the deck and wearing surfaces are subjected. The 1951 traffic record for this highway shows an average of over 3,000 vehicles per day, of which 22.9% were trucks.

Cost comparisons

Random comparisons of cost are often misleading, since very few bridges are built under identical conditions; even the few built from identical plans are subject to variations in labor and material markets, different contracting firms and construction personnel, and to wide differences in traffic conditions. It has been difficult to select jobs built at the same time as the Smoky Gulch Bridge which would give a fair comparison of cost. Contract prices for this bridge were based on replacing one-half of the roadway at a time and carrying traffic through the work. While this was not done, the prices reflect the contractor's estimate of performing the work in this manner.

There are three other methods in use by the California Division of

Highways in repairing and replacing timber decks:

1. Remove old wearing surface, shim, and r nail old deck, and replace surfacing.
2. Remove old deck, place new plank deck, and surface.
3. Remove old deck and place new reinforced-concrete slab on old timber stringers.

Contracts for repairing a large number of bridges in 1949 were less than one-half the cost of the Smoky Gulch Bridge for Method 1 and about three-fourths for Methods 2 and 3. A large contract in 1951 for Method 3 cost about 90% of the Smoky Gulch Bridge. The unit cost of smaller contracts has run higher than on the larger contracts, so that the costs of two comparable jobs in 1950 and 1951, each for only two bridges repaired by Methods 2 and 3, exceeded the cost of the steel-deck job by one-third.

Tests under truck traffic

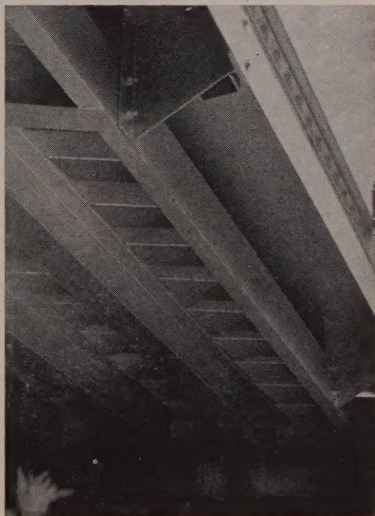
A later experiment took place at Ulatis Creek in Solano County near the town of Vacaville. U. S. Highway 40, a four-lane freeway through this area, carries a high percentage of heavy trucks. Surveys for 1952, when this section was opened to traffic, show an average daily traffic count of 12,600 vehicles, of which 1,900 are trucks. There are two bridges across Ulatis Creek; they are about 130 ft. long and are composed of five 26-ft. spans supported on concrete-pile bents which are on a 30-deg. skew. The heavy truck traffic and the 3% grade on which these bridges are built afford an excellent location for testing the experimental deck and wearing surface.

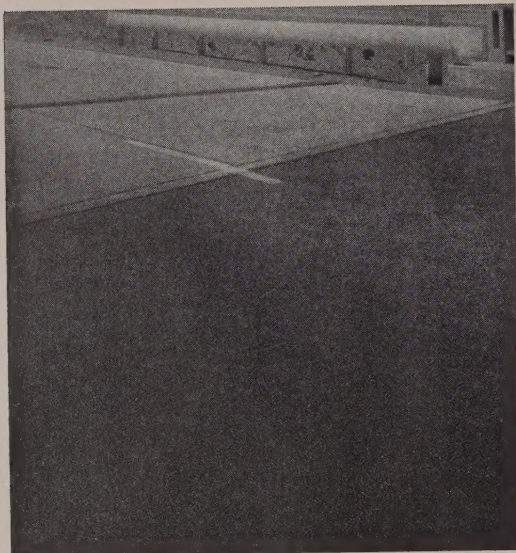
The deck units were very similar to previous designs except for the floor plates. Smooth plates were used for the west bridge, carrying south-bound traffic, and checkered plates for the east bridge. South-bound traffic is up-grade traffic and trucks are under a heavy pull but still going at high speed when they hit the bridge. This has two effects on the bridge deck; high tractive forces on the wearing surface and a decided tendency for trucks to pull into the righthand lane. Since the downhill grade over the east bridge is steep enough that all vehicles are accelerating easily, tractive forces are much less on this structure and more trucks use the lefthand lane, giving this bridge a much even distribution of traffic.

Two types of surfacing

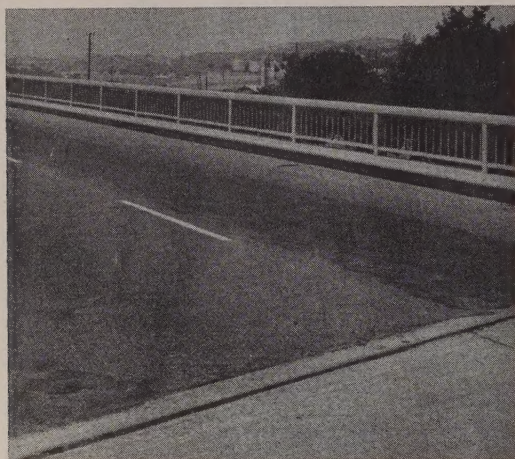
Two types of wearing surface were placed on each bridge. They were placed full width of the roadway and for one-half the length, which gives a test of each type of surface for heavy traffic in the right lane and for medium traffic in the left lane. The south half of each bridge was covered with latex-asphalt binder and

UNDERSIDE of Ulatis Creek Bridge. Visible are three wide-flange beams, diaphragm (at upper left), outside channel, curb and rail, and floor plate stiffeners. Heavy truck traffic on this bridge is providing a crucial test for the experimental deck and wearing surfaces.





LATEX-ASPHALT and screenings surface (Type 1) on right lane at south end of east Ulatis Creek Bridge, after one year of service. Bare tops of checks in checkered plate are appearing in heavily traveled wheel lines. Smooth steel plate is now preferred.



LATEX EMULSION-lumnite cement binder and screenings surfacing (Type 2) on north end of west Ulatis Creek Bridge after a year's service. At lower left is a failed spot and patch made with emulsified asphalt and screenings. Right lane shows extensive failure and patching. Better control during placing might have prevented these failures.

screenings; the north half with a neoprene latex-lumnite cement mixture and screenings. These surfaces have been designated Type 1 and Type 2, respectively.

Placing procedures

Type 1 wearing surface was made by spraying rubber latex-asphalt emulsion binder on the deck at the rate of $\frac{1}{2}$ gal. per sq. yd., and immediately covering with medium-fine screenings at the rate of 16 to 20 lb. per sq. yd. The screenings were heated and applied at a temperature between 250 and 300 deg. F. The surface was rolled with a light roller and excess screenings removed by sweeping.

The latex-cement binder for Type 2 wearing surface was composed of 26% neoprene rubber latex, stabilized with potassium hydroxide and casein, and 74% lumnite cement. The mixture was agitated until smooth and creamy and applied at the rate of 9 lb. per sq. yd. Unheated screenings were applied immediately at the rate of 20 to

25 lb. per sq. yd. and rolled lightly. This surface required a three-day curing period with twice-a-day applications of water.

Excess moisture on the freshly sand-blasted deck started a film of rust under the surfacing and a sudden shift of wind with near 100 deg. F. temperatures during the curing period dehydrated part of the surfacing before it had cured. As a result the binder did not set up as it should have. Portions crumbled under traffic and at other places it came loose from the deck due to lack of bond. Much of the loose material was later removed by a sweeper, and an armor coat of emulsified asphalt and screenings was placed over the north half of the deck.

Service record

This was the condition of the wearing surfaces over a year after they were placed. Traffic has pounded both types of wearing surface down around the lugs of the checkered plate exposing the tops over most of the deck but

without any serious effect on the non-skid properties of the deck. Except for exposure of bare steel to traffic wear and the elements, this surface appears to be in good condition.

Stripping of Type 2

The outside lane of the west bridge takes a heavy pounding, as previously mentioned, since almost all trucks use this lane, and to maintain road speed on the upgrade the drivers "gun" the trucks at about this point which applies a heavier than average tractive force. Under the heavy wheel loads there has been a large amount of stripping, which is not occurring in the more lightly traveled left lane. This is partially due to continuing failure of Type 2 surfacing, which was not completely removed before placing the bituminous emulsion and screenings.

The possibilities

Conclusions which may be made at this time are:

1. The light-weight steel deck is an efficient, economical superstructure for many locations and types of structures. It probably is not economical for 40- to 150-ft. span bridges, although no studies have been made in this class.
2. The 3-yr. record of no maintenance on the Smoky Gulch Bridge wearing surface indicates that heavy plantmix (bituminous) wearing surfaces will adhere to smooth steel plate under conditions of high temperature, steep grades, and heavy loads.
3. Use of extra-cost checkered floor plate is not recommended.
4. The Type 1 wearing surface of rubber latex-asphalt emulsion binder and screenings appears to stand up well under heavy traffic, although a year is insufficient time to estimate maintenance or life expectancy.

One of the possible future uses of light-weight battledeck floors is for redecking long span bridges. With the thin wearing surface, this can be accomplished with a big saving in dead load, thus allowing greater live loads and in some cases permitting the addition of more traffic lanes.

Personnel

The contractor for the Smoky Gulch bridge was K. B. Nicholas, Ontario, Calif. Fabrication and erection of steel was by the Bethlehem-Pacific Coast Steel Corp.

The contractor for the Ulatis Creek bridges was Fredrickson Brothers of Emeryville, Calif. Fabrication and erection of steel was by Moore Drydock Co.

Design and construction of these structures was directed by F. W. Panhorst, Assistant State Highway Engineer—Bridges. Stewart Mitchell, Principal Bridge Engineer, was in charge of planning and design, and I. O. Jahlstrom, Principal Bridge Engineer, had charge of construction.

SUPERVISING FOR PROFITS

on major building jobs

A superintendent shoulders a big responsibility for his contractor boss when he agrees to manage a major building contract. What does it take to be the "big boss"? What should he know? How should he go about organizing and completing the work successfully and profitably? Here are some thoughts drawn from firing-line experience.

WHAT KIND of man is the fellow who is supervising a major building job and what does he have to do to get the job done? These are questions that are often asked and pondered over and yet so few craftsmen, architects, engineers—yes, and even contractors understand the services that should be rendered by a good superintendent.

Many men want to be the "big boss" on the job and contractors have made the mistake of giving men high rates of pay and big titles without considering the qualifications of the man they have selected to represent them. Often this has resulted in an unhappy experience for all concerned.

For those who are interested in what I think it takes to be a good building superintendent this article will be of interest.

The challenge

What are the duties of a superintendent on a major building project? Quickly stated, the superintendent is the contractor's representative on the job. Although on smaller projects, the contractor may act as his own superintendent, on large projects the contractor selects a capable man both to represent him and to supervise the actual work. Selected for the job, the superintendent must in turn organize a group of men of necessary skills, mass materials and equipment to produce a satisfactory product according to plans and specifications, and accomplish the work below estimated costs, all within the time period allotted. Meeting all of the above requirements offers a real challenge to any man with determination, patience, perseverance, consideration and good health.

These are generalities. Specifically, a superintendent's duties begin when the contractor estimates a job. Often

By
CHARLES A. McMAHON
Project Superintendent
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Los Angeles



AUTHOR CHARLES A. McMAHON, currently project superintendent for Peck-Cahill Co. on construction of the Anheuser-Busch Brewery at Los Angeles, has successfully supervised seven major building projects under contracts totalling \$150,000,000. Some of these are referred to as examples in this article. He holds a Master of Science Degree obtained from the University of Colorado, is a member of the American Society of Civil Engineers, the Society of American Military Engineers, and the American Federation of Labor. He is a Registered Civil Engineer, Licensed Building Contractor, and a Registered Deputy Building Inspector.

he is called upon to discuss construction methods, to select alternates, to price the units of work involved, and to give his opinion on the anticipated outcome of the job. Successful contractors always depend on advice and suggestions from the man in the field before they turn in their bids. The superintendent is expected to understand manpower, equipment and other requirements of a job, and the contractor therefore leans heavily upon him for help in determining whether specified work can be completed within certain cost limits.

Early planning pays

Once the contract is awarded, the superintendent moves to the job site with the set of plans, specifications and the contract. The first step at this point is for the superintendent to familiarize himself with all of the contract conditions, the contractor's policies and methods of operation, as well as the plans and specifications.

The scope of a superintendent's responsibilities varies with the size of the job and with the contractor's business procedures. Sometimes all of the subcontracts are let through the main office; however, the superintendent often must formulate instructions to bidders and accept and tabulate sub-bids at the job site. If he has had past experience with the subcontractors, he may make recommendations before the tabulations are submitted to the general contractor for his approval.

In the early stages of the project, while demolition of existing structures and site clearance work is in progress, the superintendent should be a busy person. During this period, it is his responsibility to plan construction schedules, select work procedures, design and sketch formwork details, make material take-offs, design and build the job office and set

up construction machinery. At this point, many thousands of dollars can be saved by planning on paper ahead of actual construction.

During the early stages of the project, the superintendent should prepare an organization chart. This chart will clearly define graphically the flow of authority through the organization and the responsibilities and scope of the work of each subordinate. This will serve you as a constant reminder of the knowledge, experience, and temperament of the men you have selected for key positions. And it may save many hours during the busy days which lie ahead in smoothing out personnel disturbances.

Concrete schedules

The superintendent must make concrete pour schedules. Frequently, an architect or an engineer will not indicate the construction joints on the drawings. It then becomes the responsibility of the superintendent to locate these joints for all pour stoppages. His judgment will be based on the quantity of concrete which can be economically placed in one day with the minimum of overtime, the point of minimum shear (generally at mid-span of the flexural members), and other practical factors.

Generally, it is most economical to place as many cubic yards as possible. It is found that the set-up before the pour and the clean-up after the pour is nearly a fixed cost. By increasing the yardage up to an optimum point lower unit costs can be realized; the same crew will place the additional yardage at no extra cost if everything is carefully coordinated by the superintendent.

One of the factors that determines the speed of placing concrete floor

slabs is the curing time required before the falsework can be removed. As an example, many days were cut off the construction schedule and greater savings were made on the Pershing Square underground garage project in Los Angeles because slab forms and shores were removed in seven days instead of the usual 14 days. This was accomplished by having an approved testing laboratory break concrete test cylinders at 7 days. Because these values were above average and consistent, stripping was possible one week earlier by re-shoring the haunched flat slabs at the third points with used 4 x 4 posts.

Time means money

This example illustrates the effort a superintendent should make to reduce the number of construction days to a minimum. And it is usually not difficult to convince a contractor or an owner that overhead, interest on capital invested, insurance, general office expense, equipment rentals, depreciation, and early occupancy soon add up to figures well worth considering.

Occasionally a superintendent will meet resistance when he asks the contractor's approval for the purchase of additional form lumber, more manpower or more equipment to speed the job to early completion. If he reduces the cost of these items in terms of savings in the overall cost picture, his employer will be less reluctant to give immediate approval.

In a particular instance on the \$60,000,000 Parklarea Housing Proj-

"DAYS CUT from the construction schedule . . . on placing concrete floor slabs . . . mean savings for the contractor." The author (white shirt and tie) keeps a sharp eye on concreting crews at the Anheuser-Busch Brewery job.

ect (eighteen 13-story concrete buildings at Los Angeles), it was found that an expenditure of \$5,000 for one additional floor of form lumber and the necessary labor for fabrication resulted in a saving of \$30,000 per building! This is an excellent illustration of the fact that time means money in the production of a product. That's why a good superintendent keeps alert to time saving devices and plans his job so that workmen can produce the maximum number of units in the minimum amount of time.

By carefully studying the plans and specifications a superintendent may make suggestions to the architect for minor revisions in dimensions, materials or methods which will speed the job and result in real savings. When plans are being formulated the designers are engaged in the details of building codes, stresses, and architectural appearance of buildings, with secondary considerations usually given to construction methods. On one large project I made several suggestions to the architect, who was most cooperative. The suggestions were well received and of such scope and nature that new building permits were obtained for certain sections of the structure. With the aid of these changes the project was easily completed ahead of schedule and below the estimated costs. My reward for this work was a personal letter of commendation from the engineer to me for my practical cost-saving suggestions.

Getting together with labor

It is always advisable to hold a pre-job conference with all of the labor union officials involved, if the project is large. Minutes of this meeting are taken and copies are given



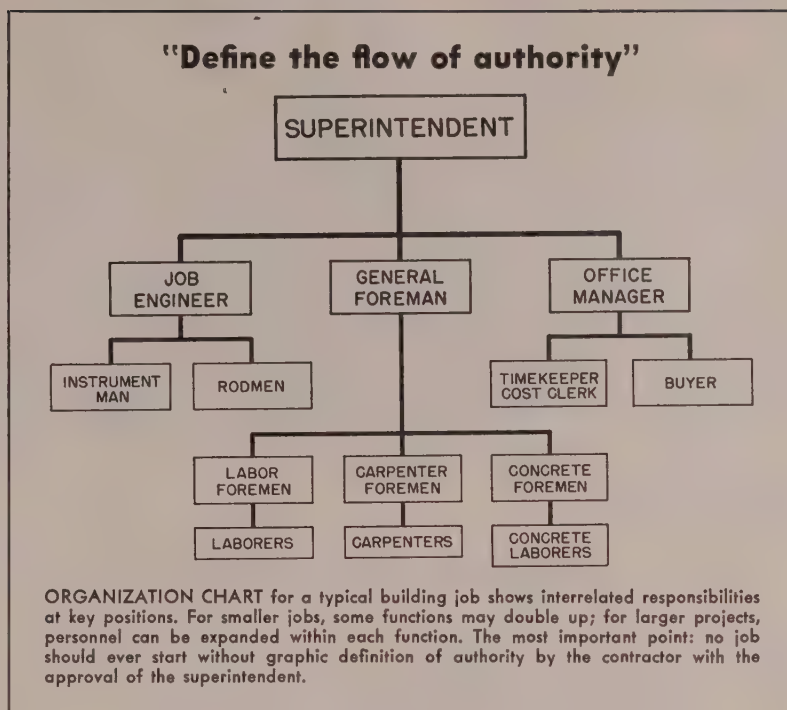
all who were present. The scope of the project, number of men in each craft required, methods for settling jurisdictional disputes, procedures for employing men, starting date, completion date, job organization, union policies, and contractor's policies are some of the most important items to discuss. The time and energy spent pays dividends in the future of the job by promoting better understanding between labor and management before the job starts.

On smaller projects the superintendent should meet and acquaint himself with the business agent who has jurisdiction over the area in which his job is located. Good relationship with these men is important because they can also assist you in selecting the best available workmen for your job. Knowledge of working rules, master agreements and common practices in the industry is important in dealing with the labor representatives. They are retained to promote the interests of their members and in doing so they may establish new precedents or invoke new working rules on your job that may affect the entire industry. Review all operations before you start hiring the men.

A sensible approach to safety

Many contractors, superintendents, and union officials talk about job safety, but this is not effective unless a definite safety program is carried down to the workman level. Should time and energy be spent on safety measures and devices? Yes, by all means. Follow through on some accidents and you will find that some contractors have been forced out of business by high losses and that others have lost bids because of high rates made necessary by the high ratio of accidents on previous jobs. A good superintendent studies the safety codes adopted by state and local governmental bodies. In regular weekly safety meetings he will discuss safe methods with all of the foremen so they are aware of them and are alerted to good safety practices.

I solicit the cooperation of the unions through job stewards to help me in my safety program. Records indicate that in most cases accidents are caused by negligence, poor judgment, or lack of mental alertness on the part of the employee. The union stewards check to see if their fellow members are wearing the proper clothing and shoes for the work in which they are engaged. After a shoe inspection among 800 men it was found that 40 of them wore shoes unfit for construction work. By keeping all of the men alert to the necessity of wearing good, durable-soled shoes the number of nail punctures decreased from twenty in one month to three the next month. Accident prevention is a constant job for a



superintendent. Start it early in the job and never let up on enforcing safety practices, even if it means reprimanding or discharging an employee who jeopardizes the lives of others by his carelessness.

Getting subcontractor coordination

One of the headaches in supervising a building job is coordination of the work of the subcontractors. If a general contractor and his superintendent will take the time to review the experience, ability and integrity of the subcontractor before the contract is let, it will save many hours of discussion as the job progresses. If subcontractors are aware of this review, it will raise the level of all of them as a group.

I have experienced very little difficulty with subcontractors, because competent men were selected. I give them my best cooperation when they arrive at the job site to do their specialized work, and I find that many of them go far out of their way to complete the work according to revised plans, changed specifications and accelerated schedules without submitting exorbitant extra charges. Treat them as part of your organization, give them as much advance notice as possible to move on to the job, be reasonable in your demands and you will find that subcontractors will help you get your job done with ease.

Accurate job schedules will keep everyone alert to the completion dates. These schedules should be sent to all engaged in the construction of the project. Knowledge of contract law and past legal decisions is some-

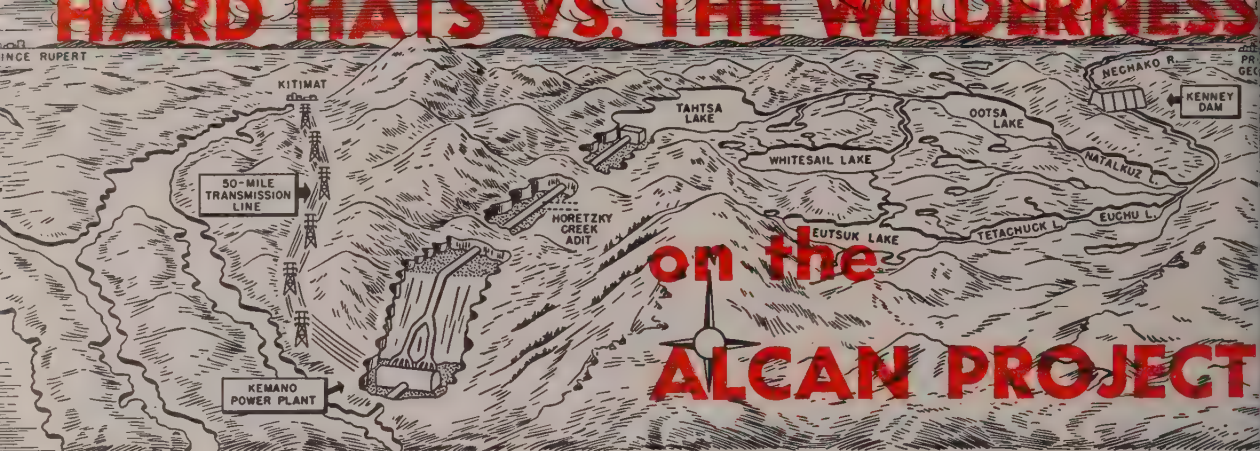
times necessary in the interpretation of the "fine print" of a subcontract.

An approved set of drawings and specifications by some governmental agency is generally required before any major building project can start. An alert superintendent will familiarize himself with all of the building code requirements. A superintendent can gain the respect and confidence of the building inspectors if he demonstrates his knowledge of the code and exhibits his willingness to comply with all of the requirements. This good relationship with inspectors may aid him in building the project and save his contractor money.

Technical knowledge

A superintendent must have knowledge of the forces of nature, materials of construction, and the determination of their physical properties. Unlike the design engineer, he must not only design for safety but strictly for economy. Since there are no set loadings and often no checks of his design by city or state engineers, he must be accurate in his assumptions and correct in his calculations because in his guiding hands rests the responsibility for many lives during the construction of any major project. If he practices "conservative" design soon his competitors will find a more economical way to design the machines and devices of construction and he will find himself out of work and his contractor employer out of business. It is the skill of the superintendent that plays a major part in the success of the contractor. All

Concluded on page 134



Art work courtesy of The EM-Kayan

INTRODUCTION

The project, the challenge, and the men

IN AN OUT-OF-THE-WAY, comparatively uninhabited but water-rich area of Western British Columbia, the capital and courage of a private industrial enterprise and the knowledge and skill of engineering-construction personnel have combined to make possible a fabulous hydroelectric project. The Aluminum Company of Canada, or Alcan, a subsidiary of Aluminum Limited and already a major producer of hydroelectric power in Eastern Canada, foresaw increased demand for aluminum and began looking for additional sources of the electric power which plays so important a part in the production of aluminum.

Rainfall records and hydrological data were available to some degree of the Tweedsmuir Park area situated in the Coast Range Mountains about 400 mi. north of Vancouver, B. C. Intensive studies of the area were begun in 1948, and the area was found to possess the two prime requisites: source of comparatively cheap production of dependable electric power, and proximity to ocean transportation. With dependable cheap power available close to navigable tidewater it would be practicable to bring aluminum oxide from a company plant in Jamaica, near bauxite ore deposits to the proposed smelter site at Kitimat, B. C.

Construction requirements

To generate and transmit electric power to Kitimat required:

1. A stoppage of run-off flow from the eastern end of a large catchment area and reservoir site, and the provision of spillways.

2. The driving of one or more tunnels under the mountain range at the west end of the reservoir and down to a power plant at a much lower level near the western toe of the mountains

at Kemano (project headquarters).

3. The construction of a transmission line spanning 50 mi. from Kemano to Kitimat.

To accomplish these purposes, so that electric power would be available in early 1954 at the Kitimat smelter site, the B. C. International Engineering Company Limited, 717 West Pender Street, Vancouver, was chosen as designing engineers and the Morrison-Knudsen Company of Canada Limited of 654 Burrard Street, Vancouver, was chosen as general contractor for the power development.

What's made it possible

The Alcan Project cannot be adequately described merely by quoting statistics to show a cost of so many hundreds of millions of dollars, or so many billions of cubic feet of water impounded, so many miles of tunnel and transmission line and so many million horsepower or kilowatts produced. The potentialities have been here since the area was released from the grip of the last glacier. The fortuitous combination of Alcan with capital, knowledge through previous experience in power development for its requirements, and the courage to support its convictions, and Morrison-Knudsen Company of Canada with resources of experienced key personnel required for large engineering construction projects has made possible the present development. Progress has been facilitated by quick decisions and direct action possible only where private capital and contracting as a private enterprise are involved.

Operational set-up

Kemano, Camp 5, is the administrative and operational headquarters for the power end of the project. It is located 10 mi. up the Kemano River

from tidewater near the end of Gardner Canal of the inland water system. There were no previous improvements in the vicinity except an Indian village on Kemano Bay. A slip was dredged, and piers, a float and a wind-break for seaplane landing were constructed. Unloading facilities for handling cement barges and an "A"-frame derrick for handling lifts up to 75 tons from barge to trucks, a warehouse, beach camp and storage area were provided. A good road was built to Camp 5. A total of 100,000 tons of waterborne freight and thousands of passengers have been routed this way, in addition to airborne passengers and freight. Some additional freight has gone directly to a dock at Kildala for the transmission line.

At Camp 5 are the field offices of Aluminum Company of Canada Limited, B. C. International Engineering and Morrison-Knudsen Company of Canada Limited. It is the job headquarters for the Royal Canadian Mounted Police and a magistrate's court. A branch of the Royal Bank of Canada is being operated for the convenience of the personnel. Staff personnel are housed here and additional housing in prefabricated houses and privately owned trailers is available at Wachwas Camp, 2 mi. down the Kemano River Valley. All camps and work sites except in the Tahtsa-Nechako area are supplied from Camp 5 with men and materials. A grocery, commissary, post office, hospital, movie theater and other recreational facilities, dairy or milk reconstituting plant, bakery and mess-hall are in operation. A school with enrollment of over 100 is located at Wachwas Camp. Most of the buildings, including warehouses, are of the quonset type.

Communication with Vancouver where the procurement, shipping and



liaison offices are located is by radio-telephone. Construction service roads are built up steep Horetzky Creek to a camp at the Horetzky adit of the power tunnel and up the Kemano River and over the summit to the Kildala River and on to Kitimat, serving camps and construction work along the transmission line. All transportation to and from Kemano is closely regulated in the interest of the project.

The staffs at Kemano for project operation include:

ALCAN

K. Roestad.....Resident Engineer
C. W. Abrahamson
.....Asst. Resident Engineer

B. C. I. E.

N. L. Hinkson
.....Chief Construction Engineer
F. W. Runnalls.....Resident Engineer,
Transmission Line
R. Covell.....Resident Engineer,
Powerhouse and Tunnel
G. E. Johnson
.....Chief Mechanical Engineer

M-K

A. O. Strandberg.....Project Manager
R. Madsen.....Asst. Project Manager
R. E. Reed.....Area Engineer
J. W. Libby.....Construction Engineer
A. Stickney.....Chief Tunnel Engineer
E. H. Steelman.....Cost Engineer
H. E. Echols.....Office Engineer
H. J. Garibaldi..Administrative Manager

The contractor's organization for construction of the project is based

WESTERN CONSTRUCTION

NOBODY LIVED HERE except Indians before Alcan and Morrison-Knudsen moved in. This is Kemano, Camp 5, administrative and operational headquarters for the project, huddled on the valley floor below the mountain where the project's powerhouse is being carved out underground. Clearing up the mountain marks the location of the aerial tramway to 1,600- and 2,600-ft. levels, where adits were driven for penstock tunnels. The crews who pioneered access roads on the job (below) are all eligible for certificates as Grade A alpinists. The country is only slightly less than 100% rock.



"M-K was ready . . . for the unusual and difficult"

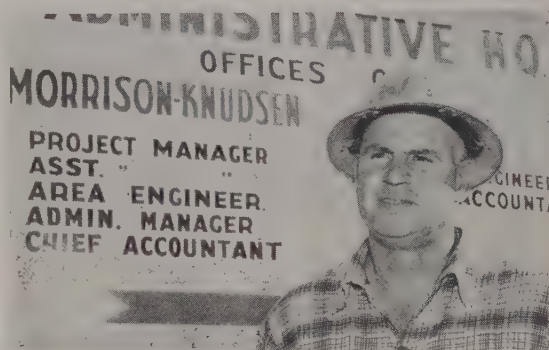
"WHEN construction work for the power development of the Nechako-Kitimat (known overall as the Alcan Project) began, the full impact of unfavorable conditions of weather and topography and the difficulties of transportation and communication were soon felt. It was necessary to complete first what, taken by themselves, would be considered

good-sized construction jobs before construction of permanent project items could begin. Establishing the lines of supply and communication to the job, providing the required docks, bridges, roads, camps, adds to underground workings, an aerial tramway, setting up the construction plant and procuring equipment required vast effort.

"Fortunately, Morrison-Knudsen Co. had available from its far-flung operations key personnel experienced in meeting unusual or difficult situations. The cooperation of labor officials and governmental agencies affecting the work and skill and energy displayed by all classifications of personnel recruited throughout Canada have been most encouraging. These men, and selected sub-contractors, have brought the work to the stage where it is possible to meet the schedule for furnishing electric power to the Kitimat pot heads in early 1954.

"We appreciate your decision to publish informative articles covering the work on this project in *Western Construction*."

A. O. STRANDBERG
Project Manager, Alcan Project
Morrison-Knudsen Co. of Canada, Ltd.
Kemano, B. C.



A. O. STRANDBERG

upon supervision and direct control being extended to each phase of the project by superintendents of crafts or functional sections. This type of organization requires the highest degree of cooperation in the field and the selection and placing of men in key positions who, through long experience and training and knowledge of modern techniques, are fully equipped to carry on their assignments.

Superintendents for the contractor include the following:

G. S. Binger.....	Transportation
F. Buckley.....	Plumbing and Pipe Fitting
L. Christopherson	Labor
R. E. Davis.....	General Superintendent,
	Underground Operations
J. Delaye	Penstocks
A. J. Downey.....	Cable Stringing,
	Transmission Line
H. Fisher	Rigging
A. P. Gorman	
	Director of Labor Relations
K. Jenkins	Warehousing
D. L. Keneagy	
	Director of Payroll and Timekeeping
B. M. Johnson.....	Mechanical Installation

W. Hawkins	Mechanical
A. Hunter.....	Aggregate and Batch Plant
E. E. Larkin.....	Steel Erecting,
	Transmission Line
D. T. Lind.....	Carpentry and
	Powerhouse Construction
M. Marchetti	Camps
F. Meade.....	Reinforcing Steel
O. N. Parker.....	Electrical and
	Powerhouse Installation
W. Richards.....	Road Construction
	and Maintenance
H. Smart.....	Director of Personnel
A. Smithies	Concrete
W. Whidden.....	Director of Safety

PART 1 OF 4

Underground powerhouse and penstocks

THE UNDERGROUND powerhouse and penstocks are unique only as to size. The design of the penstocks and upper manifolds utilizes the encasing concrete and rock to take stresses, permitting use of thinner pipe liner. To check the design assumptions, a 10-ft. diameter hollow steel sphere was concreted and grouted inside a rock chamber excavated for it near the exploratory tunnel of the powerhouse. A system of exterior holes with Carlson gauges and interior rods was provided to record the strains under water pressure within this sphere of from 0 to 3,600 psi. Other practical considerations were the advantages, under surface topography and winter conditions prevailing at Kemano, of construction and

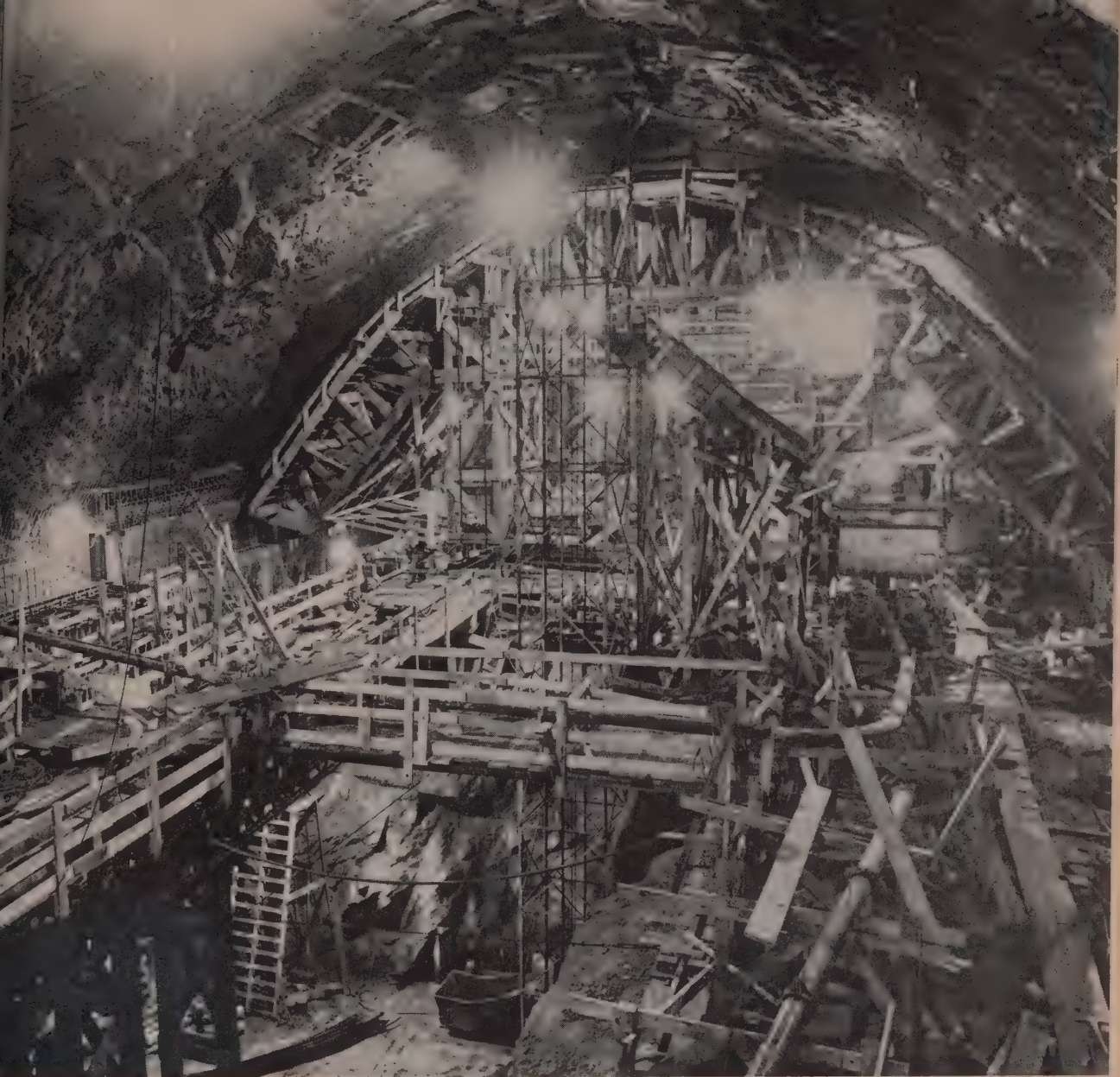
maintenance of these structures underground.

Proceeding downstream from the west end of power tunnel No. 1, just beyond the surge shaft, the underground channel branches to right and left, thence through vertical curves down 48 deg. to the horizontal, through penstock shafts Nos. 1 and 2. These shafts are 180 ft. apart at the upper level diverging to 240 ft. apart at the lower level, excavated to 15-ft. diameter for a distance of 1,225 ft. to the 1,685-ft. level; thence 675 ft. on a slope of .0025; thence down again at 48 deg. a distance of 1,984 ft. to the 211-ft. level. There they continue ± 311 ft. on a slope of .0025 to a point where each penstock branches into four manifolds; thence through 51-ft.

spherical valves in a 20- by 465-ft. valve chamber 35 ft. high; thence 140 ft. to the turbines. Eight tailrace a matter of about 20 mi. to Pacific branches, one from each of the 8 units provided for in the initial installation, converge to the tailrace tunnel 27 ft. by 40 ft. high and 1,400 ft. long to its portal where a canal will carry the discharge another 1,500 ft. to the Kemano River.

River flow reversed

Thus a considerable volume of water formerly flowing north to east to south to west in the Fraser River system to the Pacific Ocean at Vancouver will flow westward through power tunnels and the Kemano River Ocean tide water.



The inclined penstock sections were driven from the bottom upwards. The horizontal section at the 1,600-ft. level and the raise upwards were reached from a 14- by 16-ft. adit 1,170 ft. long, on the side of the mountain. Pilot raises 6 ft. wide by 10 ft. high were driven upwards followed by horizontal timber partitions making the bottom half of the raise a muckway. This muckway was trapped at the bottom and muck was discharged into trucks from pneumatically controlled gates.

The trucks hauled the muck through the valve chamber, drainage and tailrace tunnels to protective dykes along the Kemano River at Camp 5. A car on a narrow gauge track with head-block as near the bulkhead as possible and operated by a hoist from below serves the head-

INSIDE THE POWERHOUSE (and inside the mountain), with arch concreting under way. Bailey bridge supports rail for arch forms at left; one of three sets of arch forms is in background. Concrete is delivered by mix trucks through muck raise to hopper at bottom of hoist tower. Chute and Pumpcrete machine are at center right.

ing. The crew drilled and blasted, then followed up with the bulkheads, advancing as much as 28 ft. per day per heading. When the pilot shafts were holed through the timber was removed and the shafts enlarged to 15-ft. diameter from the top downward.

The horizontal sections of the penstocks were advanced from the valve chamber level, using a truck-mounted jumbo for drilling and blasting and $1\frac{1}{2}$ -cu. yd. Eimco overhead loader to dump into trucks. At the 1,600-ft.

level, which was approached through an adit from the mountain side, similar drilling and blasting procedure was used. Here a 75-hp. Conway mucking machine loaded mine cars hauled by mine locomotives to the dump on the mountain side. A rock pit will be provided in the power tunnel ahead of the penstocks.

The inclined and horizontal sections of the penstocks will be lined with 11-ft. diameter steel pipe varying in thickness from 9/16 to 1-15/16 in. Stresses are transferred to the surrounding rock through a concrete embedment placed by the Prepakt method. Supervision of the placing of this concrete will be done by the Prepakt Co. of Cleveland under a sub-contract.

The straight sections of pipe liners are received in 28-ft. lengths or 20



AT THE 2,600-FT. "Y", looking toward portal of power tunnel adit, with the two penstock branches veering to left and right. Butterfly valves will be installed in chambers at this level.



DRILLING from a skid jumbo in a penstock raise 900 ft. below 2,600-ft. level.



and West Tahtsa for possible future tunnel maintenance purposes.

Aside from the exploratory drift there are four principal openings in the precipitous mountain walls of the Kemano Valley at Camp 5, driven 1,400 ft. to the powerhouse. These are: the tailrace tunnel through which water will flow from the first eight turbines, the ventilation tunnel for ventilating the underground works, the cable tunnel carrying high voltage conductors to a covered concrete tunnel to the switchyard, and the access tunnel entered through a properly inscribed concrete portal at the parking area on the permanent road from tide water. This access tunnel will lead to the administrative and operational offices in the control and service bay of the powerhouse.

The ultimate length of the powerhouse will be somewhat over 1,100 ft. to accommodate 16 units. The initial excavation now being completed to accommodate eight units plus some clearance for future work is 700 ft. long, 140 ft. high from bottom of pit liner pads to top of parabolic concrete

HAPPY GRAVEYARD SHIFTERS group around Superintendent Charlie Swartz (center) after holing through penstock raise at 1,600-ft. level.

of arch and 83 ft. wide with maximum width of excavation of 100 ft. at the roof arch haunches.

While the various tunnel headings were advanced using track and truck-mounted jumbos for drilling and blasting short holes, the powerhouse excavation required a combination of methods. A 27 x 27-ft. drift was driven the entire 700-ft. length of the powerhouse along the center at the main floor level, elevation 202.5. Muck was removed by 1½-cu. yd. electric shovels loading into 10-cu. yd. diesel dump trucks. All trucks working underground are diesel-powered and equipped with exhaust scrubbers.

From the exploratory adit and a manway raise from the 27 x 27-ft. drift, a 10 x 12-ft. drift was driven the full 700 ft. length at elevation 281. Seven transverse slots 10 ft. wide and on about 120-ft. centers were excavated from 10 x 8-ft. cross cuts extending to the outer line of each haunch. Then 10 x 10-ft. raises were driven upwards to the top of the arch. From the upstream edge of the lower 27 x 27-ft. drift 8 x 8-ft. muck raises were driven vertically upwards to the transverse slots for chuting muck from the arch section excavation to trucks at the main floor level. The rock between transverse slots was diamond-drilled 55 ft. horizontally each way from the slots and the muck removed by electric slushers through the muck raises.

Powerhouse concreting

As soon as the arch section excavation had advanced far enough from the north end of the powerhouse, forming and pouring of the heavily reinforced haunch sections were begun, and two rails were laid on concrete footings longitudinally of the powerhouse on 30-ft. centers. Three sets of travelling arch forms were brought in through the No. 1 muck raise in sections and assembled on the rails.

Each arch form permitted the pouring of a 30-ft. monolithic section of arch above the haunches. Movement of the arch forms and timing of the pours were scheduled for the 23 separate arch sections covering 690 ft. of the powerhouse. Rails for the construction cranes spanning the powerhouse excavation were installed on the haunches at either side. The concrete arch varies in thickness from 1½ ft. at the crown to 5 ft. near the haunches.

As quickly as arch pours could follow the arch excavation and space be made available, vertical diamond drilling was begun of holes on approximately 5½-ft. centers and 71 ft. long to remove the rock from the main body of the powerhouse. Drilling and blasting was planned to first remove the rock over the 27 x 27-ft. drift and then work toward the walls. Muck was loaded by 1¼ x 1½-cu. yd. elec-



POWERHOUSE with arch concreting completed and turbine pits being excavated. Looking south, penstocks enter from left and tailraces go out at right. Initially, powerhouse is 700 ft. long, 140 ft. high (from bottom of pit liner pads to top of arch), and 83 ft. wide, and will house eight turbines. Ultimate length of the powerhouse is 1,100 ft. to accommodate 16 units.

tric shovels into diesel trucks and hauled out through the tailrace units and tailrace tunnel. Much of this muck was used in permanent road fill and fill for the switchyard and the parking area at the access tunnel portal. A small amount of rock-pinning was required in the arch section and a larger amount at two slip planes in the rock walls.

Credits

Diamond drilling operations were carried out under sub-contract by Boyles, Selby and Boyles of Boise, Idaho, with Pete Chessler in charge of their work. Superintendent Charlie Swartz established a fine record for performance and safety of operation in the powerhouse and penstock excavation under R. E. Davis as General Underground Superintendent. D. T. Lind as General Carpenter Superintendent, F. Meade, Reinforcing Steel Superintendent and A. Smithies, Concrete Superintendent, were directly responsible for pushing the arch construction. Other Morrison-Knudsen personnel directly employed in this phase of the work were J. W. Libby, Construction Engineer; A. Stickney, Chief Tunnel Engineer; W.

Hawkins, Mechanical Superintendent, W. Whidden, Safety Director.

At this writing (September) progress is being made on the substructure within the powerhouse. Work is soon to begin on the installation of the three turbines and generators, the penstock liners, valves, and on the switchyard structure. Very little of the enormous amount of work done on the project at this time is visible at Camp 5. A few low switchyard foundations, tunnel portals, inconspicuous in the mountain side, two piers and abutments for a bridge across the tailrace channel, a few piles of tunnel muck, and construction material spread out wherever space is available within ½ mi. of the portals are about the only evidences of night-and-day construction activities in the mountain. Even the nearest transmission line towers now erected are out of sight and around a rock bend up-river from camp.

PART 2 of this series will appear in next month's issue. A later article in the four-part series will include a list of major portable and mobile equipment at the Kemano area.



Colorado's first cement stabilized base project

... is being followed closely by a second. Blow sand near site mixed with 7% cement gives desired strengths. Use of in-place materials will reduce costs on second job.

COLORADO'S first soil cement stabilization project came to an end on July 11, 1953, and a second project (actually a continuation of the first) was immediately advertised for bids.

The first project, awarded on August 27, 1952, to Inland Construction Co. of Cheyenne, Wyoming, consisted of soil-cement stabilization of 7.208 mi. of secondary road starting 6 mi. south of Brush towards Woodrow. Initial funds for the project were made available to the Department of Highways in December 1950. Planning started in February 1951.

Planning problems

Preliminary investigations showed that alignment and grades on existing road were satisfactory for 50 mph. speed, which meets minimum requirements for a secondary road of low traffic volume. Traffic volume on the road (estimated 20 yr. hence) is about 500 vehicles per day. The primary need on the existing road was base stabilization and a wearing course, plus one major and several minor drainage structures.

By
THURLOW C. RESEIGH
Roadway Plans
Engineer
Colorado State
Highway Department



The Colorado Department of Highways standard method for flexible base design utilizes California Bearing Ratio (CBR) values to establish thickness of stabilization materials required on A-2 through A-7 soils and Stabilometer (R) values to establish thickness of stabilization materials required on A-1 and A-3 soils. Stabilometer (R) values are also used as a measure of quality of the proposed sub-base and base courses.

Cohesimeter values of cement- or asphalt-treated bases and asphaltic wearing courses are used to reduce total cover requirements as established by CBR and R values of sub-

BULK CEMENT, delivered in hopper cars to railroad siding, is brought to job in covered dump trucks, and there fed into windrow from this cement tanker equipped with a Wood automatic feeder.

grade soils. Cohesimeter values for several types of base (semi-rigid and flexible) and wearing-course construction used in Colorado are: Soil-cement bases 3,000, asphalt-stabilized bases 200, gravel bases 100, plant-mixed asphaltic wearing courses 400, road-mixed asphaltic wearing courses 200.

Requirements

Soil profile taken along centerline of existing road showed that the southern portion of the project had 0.0 to 0.1 ft. of gravel surfacing; 0.1 to 0.3 ft. of A-2-4(o) materials; 0.3 to 3.0 ft. of A-6 or A-7 material, and the northern portion of the project was 0.0 to 0.1 ft. gravel surfacing; 0.1 to 3.0 ft. of A-6 or A-7 material. CBR values on the A-6 and A-7 materials were 2.5 ft. plus or minus and in accordance with standard Colorado design methods required a total of 20 in. of cover in the case of asphalt-treated base (flexible base design) and 8 in. of cover in the case of soil-cement base (semi-rigid base design). The difference in total cover requirements is due to cohesimeter values of 100 and 200 for gravel- and asphaltic-treated bases as compared with 3,000 for a soil-cement base.

The alternatives

Materials available for stabilization courses consisted of:

- (1) A-2-4(o) and A-3 blow sand with an R value of 67 and an average haul distance of 3 mi.

This material would make a soil-cement base with 7% cement, but it would not make a satisfactory asphalt mix.

- (2) A-2-b(o) sand and gravel with an R value of 68 and an average haul of 20 mi. This material was the closest source that would make a satisfactory asphalt mix.
- (3) The possibility of treating the existing A-6 and A-7 sub-grade soils with cement was investigated by laboratory test. With as high as 14% cement, the results were unsatisfactory.

Comparative economies

Cost comparisons were made on all of the various methods of stabilization. The cost of importing 6 in. of A-2-4(o) material and treating it with 7% portland cement plus placement of 1½-in. road-mixed asphaltic wearing course including seal coat appeared to be the most economical, so plans were completed on this basis.

The project was advertised on August 7, 1952. When the bids were opened on August 21, 1952, Inland Construction Company of Cheyenne, Wyoming, was declared to be the successful bidder.

In addition to the soil-cement stabilization, this project called for construction of a nine-span timber bridge on Beaver Creek. Because he started late in the construction season, the contractor decided to build the bridge during the fall months and to begin the soil-cement stabilization as soon as possible in the spring.

Mixing and placing

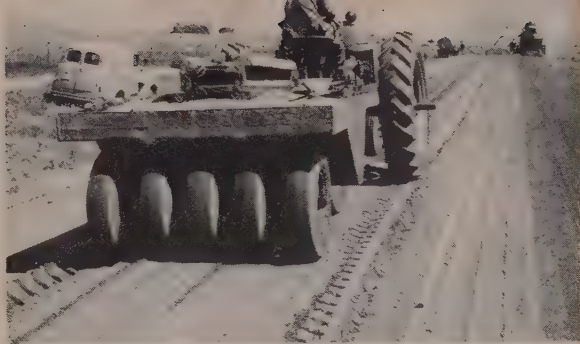
In May, 1953, the contractor reshaped and re-compacted the existing roadway to prepare it for receiving the 6 in. of imported A-2-4(o) material to be cement-treated. For this work he used two Euclid scrapers, one No. 12 motor patrol, and a two-unit tamping roller. Specifications called for minimum field densities of 90% when tested in accordance with AASHTO Method T 99 Modified. Contractor obtained field densities ranging from 96 to 102% which were well above minimum requirements.

Due to an unusual amount of rain during the month of May, 1953, the actual soil cement operations did not begin until June 11, 1953. The A-2-4(o) selected borrow material was brought out on the roadway in dump trucks and the windrow for soil cement operations was formed by means of a Wood windrow sizer. Gradation of the A-2-4(o) material to be treated with 7% portland cement was:

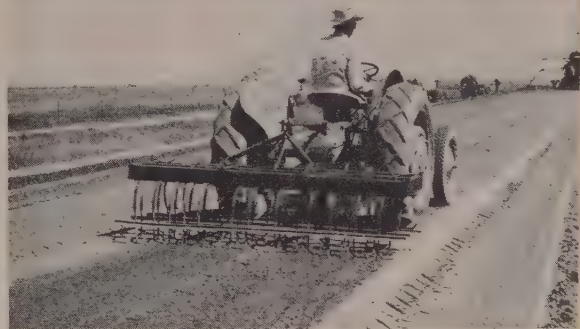
Passing No. 10 sieve.....	100%
Passing No. 40 sieve.....	90%
Passing No. 200 sieve.....	18%

Type I bulk cement was furnished by Monolith Cement Co., of Laramie, Wyoming, and shipped to a siding at Brush, Colorado, in hopper cars. The

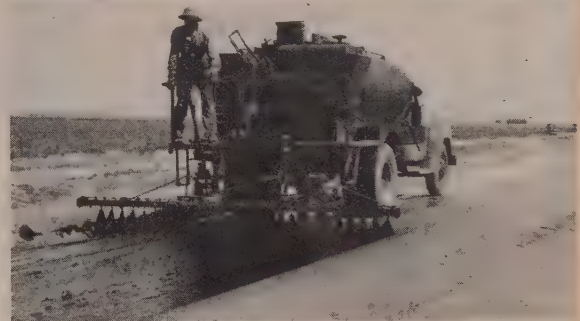
SECONDARY COMPACTION is accomplished by a rubber-tired roller after initial compaction by an empty one-unit sheepfoot roller.



FINGER WEEDER mulches surface while compaction with rubber-tired roller is continued.



AFTER SPRINKLING, and with loose material skinned, RC-2 seal coat at rate of 0.2 gal. per sq. yd. completes base work.



cement was then hauled to a storage bin on the project in covered dump trucks. From the bin the cement was taken out onto the project and placed in windrows in a 125-bbl. tanker equipped with a Wood automatic feeder. Mixing of the A-2-4(o) material and cement was accomplished by means of a Wood mixer. Water was fed into the mix from a 1,400-gal. water tank mounted on the mixer. Tractive power for the mixer was a D-8 Caterpillar.

Compaction and finishing

The mixed soil cement was spread with No. 12 motor patrols and then loosened with a farm cultivator. Initial compaction was obtained with an empty, one-unit sheepfoot roller.

Further compaction was obtained with a rubber-tired roller. The surface was then mulched with a finger weeder and rolling with a rubber-tired roller was continued. The compacted soil cement was then moistened with sprinkling trucks and, as soon as the soil cement mixture had set up sufficiently to hold a motor patrol without rutting, the surface was "tight bladed" or "skinned" of all loose material, again sprinkled with

water, and an RC-2 seal coat was applied at the approximate rate of 0.2 gal. per sq. yd. by an oil distributor.

Soil cement operations were completed on June 27, 1953. The best day's run was 4,100 ft. made on June 25.

The Inland Construction Co. had in use about 35 men on the project during the actual soil cement operations. Compressive strengths of samples of the soil cement mixture compacted in accordance with the standard AASHTO compaction method were in most cases well above 400 psi, which is considered a minimum for this type of base.

A 1½-in. sand-asphalt wearing course using RC-3 asphalt was then placed over the soil-cement base. The mixing and aeration of this RC-3 sand-asphalt mat was accomplished with a Seaman Pulvi-mixer, then it was laid down with blades. This work was completed by July 11, 1953. The Department intends to seal this mat as soon as it has cured sufficiently.

At about the time that work was completed on Project No. S 0021(1) for 7.208 miles, more money had been appropriated and plans were completed for Project No. S 0021(2),

... Concluded on page 75



VIBRATOR MAINTENANCE PROGRAM at Folsom Dam keeps 'em going four times longer

IF YOU work out and follow maintenance procedures on mass concrete vibrators in the same way that you would for a belly-dump wagon or a power shovel, you can boost your hours of trouble-free operation on vibrators from 20 or 30 to as much as 150. That's the idea, and also the achievement, of R. A. "Blackie" Scriven, chief electrical superintendent for Merritt-Savin, the prime contractor on Folsom Dam. There are some subtler points too, aimed at effectively educating the men who use the vibrators. The whole system reduces to two things—a little modification of the vibrators and a maintenance log book which Scriven keeps up-to-date with pages devoted to the job history of every one of the 12 Jackson VS-4 electric vibrators on the job.

Improvements necessary

Scriven admits that he was partial to another brand of vibrator when the Folsom work started; in fact, he says he darned near threw the Jacksons out when they first arrived. And he wasn't too happy when the machines consistently let in moisture and had their stators burn out. But he took a more realistic view of the situation, worked up a healthy interest in making the machines work, and has come up with some fine results.

Judging from early job experience, some modification of the vibrators seemed to be in order. Scriven threw this job to his vibrator repairman, George Thompson, who worked out

changes that have since been built into every new vibrator arriving on the job. The big thing was to keep water out of the mechanism. Also, there was a lot of trouble with the rubber coupling between the vibrator and its "handle." Partly due to operators' carelessness, but largely because of the plain nature of the beast, these couplings were twisting apart long before a reasonable amount of operational service had been achieved. First, Thompson tackled the moisture problem.

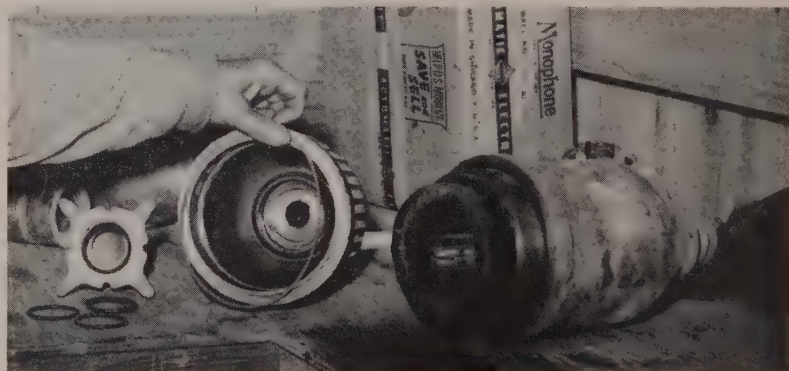
A little machining at two make-up joints on the vibrator head and the installation of neoprene O-rings did the trick. The results are shown in accompanying photographs. The machining was done so that there is still

metal-to-metal contact, as with the original vibrator design, but the joint is sealed by the O-rings. Technically, the joints involved are the one where the spade point connects to the lower motor case assembly and the one connecting lower and upper motor case assemblies. Anyone who works with vibrators knows what this means: where the nose screws on the head, and where the two parts of the head screw together.

Moisture protection

It's one thing to try to keep the moisture out. It's another thing to treat the motor so that it can stand the little moisture that does get in. Scriven and Thompson decided that factory treatment of the motors was-

O-RINGS fit in place at two points as shown here. Machining makes room for them but preserves metal-to-metal contact.



't adequate. So they have triple-ipped all stators in varnish and aked them. So much for moisture rotection.

To provide restraint in the rubber oupling and make it last longer, Thompson has bridged the coupling in each side with straps of 5/16 x 1-in. steel, welded to the hose clamps at each end of the coupling. This modification is apparent in an accompanying photograph of the vibrators at work in one of the pours.

Regular servicing schedules

As a regular thing, the vibrators are taken from service after between 100 and 125 hr. of operation and given a thorough going-over. Scriven and Thompson keep track of hours of operation simply by checking with the batch plant operator's record for hours of pouring. On at least one occasion, however, a vibrator has stayed in the pour continuously for 148 hr. When a vibrator is brought in for maintenance, Thompson can dismantle it completely in 10 min. To get this speed he has had to build some of his own tools—his own bearing pullers and stator pullers, for instance. These and similar tools are powered by a Greenlee hydraulic draw bar salvaged from a hole punch outfit.

No matter what you do in the way of modifying or giving regular service to a vibrator, things still happen on the pour. Moisture remains a problem. It will get into a vibrator, cause a short, and burn out the windings. To avoid this, Scriven has seen to it that the power cables at every pour location have circuit breakers wired in ahead of each vibrator.

Getting operators trained

Then he educates the operators. Two of the worst troubles used to be vibrator damage caused by hauling them out of the pour by the cord or by leaving them stuck upright in the concrete to be knocked over and put out of action by a swinging 4-yd. bucket of concrete. This kind of trouble is now at a minimum, and not entirely because Scriven got after the guilty operators. That alone didn't do it.

Instead, he simply made appropriate notations in his maintenance log for the vibrators, showing not only the nature of the trouble and the repairs, but also the cause. When the downtime situation got really seri-

ous, Scriven could count on having the concrete superintendent and shifters come around to complain. Then he would open up the log! The result has been the best sort of co-operation from other "departments" on the job, and the vibrator operators now pay strict attention to business.



GEORGE THOMPSON has rigged his shop for quick work; special tools pull a vibrator apart in 10 minutes.

All of Scriven's efforts haven't been "against" those operators. He noted that they were handling the vibrators exclusively by means of the two circular handles on the vibrator shaft. As a matter of fact, the additional handle above the switch was in the way and causing bruises. So, all the vibrators on the Folsom work now have had that handle cut off, another point in smoother operation.

Needless to say, Scriven has changed his opinion of the Jackson vibrator. The company can take some credit for this, especially since they have observed Scriven and Thompson's job modifications and may incorporate them in later models. But the success at Folsom is largely due to Scriven's own conscientious efforts. Proper maintenance and care in operation is the whole story. It can be the same on any job, and with any machine.

ASTM studies "atomic science and soils"

THE RESULTS of intensive research carried out by ASTM Committee D-18 on Soils for Engineering Purposes have been published in the new edition of the ASTM Symposium on the Use of Radioisotopes in Soil Mechanics. The three papers in this 96-page technical publication represent the results of independent development and the use of apparatus

which applies certain phases of atomic science to the problem of the importance of the strength and supporting power of soil masses when they are used as an engineering material. This Symposium is available at a cost of \$1.25 from Headquarters of the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pennsylvania.

COLORADO SOIL-CEMENT

... Continued from page 73

which extends the original project another 8.654 miles towards Woodrow, Colorado.

From an economic standpoint, this second project appeared to be more adaptable to soil-cement construction than the first project because the "in place" soils could be satisfactorily treated with cement or could be blended with small amounts of imported materials to make a satisfactory soil-cement mixture.

The "in place" soils on this second project consisted of A-2-4(o), A 4(1), and A 4(3) materials which, due to the development of an oil field in the vicinity of Woodrow, Colorado, county highway maintenance forces had hauled in and covered with 2 in. of gravel to make the road usable.

Numerous laboratory tests have indicated that a non-plastic soil passing a No. 200 sieve in the range of 20% to 30% will make a satisfactory soil-cement mixture using a minimum amount of cement.

On Project No. S 0021(2) the A-2-4(o) material had 26% passing a No. 200 sieve. Mixing 4 in. of this soil with the 2 in. of gravel that the county had hauled in still kept the per cent passing a No. 200 sieve of the mixture above 20. The A 4(1) soils had 38% passing a No. 200 sieve. Mixing 4 in. of this soil with the 2 in. of gravel brought the per cent passing a No. 200 sieve of the mixture to less than 30. The A 4(3) soils had 51% passing a No. 200 sieve. Mixing 2 in. of this soil with the 2 in. of gravel plus 2 in. of imported A 3(o) soil (with 8% passing a No. 200 sieve) brought the per cent passing a No. 200 sieve of the total mixture within the 20 to 30 range.

Bids were opened on Project No. S 0021(2) on July 31, 1953, and Inland Construction Co. was again the low bidder with a bid of \$148,438.50, as compared with second place bid of \$148,769.80 submitted by Peter Kiewit Sons' Co., of Denver, Colorado.

Based on contract unit prices, the cost per mile for 6 in. of soil cement plus 1½ in. of sand-asphalt mat, including seal coat on Project No. S 0021(1), was \$24,100. Due to our being able to use "in place" soils and much keener competition in contractor bidding for this type of work, the cost per mile on Project S 0021(2) for the same type of construction was reduced to \$17,900.

Personnel on the project included Edward W. Oviatt, construction engineer; Linn B. Hart and W. D. Howe, resident engineers for the Colorado Department of Highways, and Curtis Spatz, superintendent for Inland Construction Co. E. G. Robbins of the Portland Cement Association assisted the Department engineers and the contractor in various construction problems encountered.



THE SEQUENCE. PIONEER—Drill 3 to 5 lifter holes longitudinally at grade, 20 to 30 ft. Load. Back off. Shoot. Muck clean. Move up to next face. Complete pioneer cut. **COMPLETION**—Drill right angle lifters (as pictured above) 3 to 6 ft. apart and 15 to 22 ft. deep. Shoot. Clean up to grade or below.

Lifter drilling and shooting puts road to grade through 100% rock

THE PICTURES on these pages show a rough rock job made easier by a remarkable demonstration of the techniques of lifter or horizontal hole drilling and shooting. The job, near Estacada in eastern Clackamas County, Oregon, required the carving out of a steep, sloping river bank through almost 100% hard rock for a 12- to 18-ft. roadway where formerly there was not even a foot trail. The job is now being finished by Miller & Strong, Eugene, Oregon, contractor. Chuck Strong is to be credited for his ingenuity on this job for attempting and accomplishing procedures which apparently have not been done before and "should not be done."

Alternatives

The inaccessibility of the site was defeated by the application of the lifter hole principle and opening of the roadway on grade by working from the end and drilling the "pioneer"

holes longitudinally with the road line. The only alternative to this system would have been: a tremendous amount of hand drilling above grade; partial or preliminary shooting above grade; rough foot trails for supply; extended facilities for air and tool supply.

The drill

A key to the operation was the use of the new "Eeco" mounted drill, just introduced on the market in the West by Eugene Engineering Co. (and described on page 145 of the September 1953 *Western Construction*). This drill is designed to be mounted on any tractor with sufficient power to drive the unit's compressor. A bracket bolted onto the rear of the tractor mounts the compressor, air receiver, and water tank. The unit's base frame is similar to an angle dozer "C"-frame, except that it is lighter and stiffer. A sliding clamp, fixed in any position on the mast which is fastened

to the base frame, may be fixed in any position by clamp bolts to allow the drill boom to be fixed in any position on the mast and from parallel to right angles with the tractor. The sliding clamp is raised or lowered by a cable from an air winch.

Operation

The drill assembly consists of a standard 4-in. drifter, standard wagon-drill feed motor, chain and sprockets and a 23-ft. drill track. Total travel of the drifter is 20½ ft., which allows drilling to 20 ft. without changing steel. Drill and boom are balanced so they may be swung in a vertical plane by one man. For dry drilling, operation is similar to standard wagon-drill operation, with a capacity for fast drilling of about 700-800 ft. of 2½-in. hole per 8-hr. shift. For flotation drilling, the operation consists of feeding air and a small amount of water into the drill steel through a needle valve assembly.

DRILL viewed from rear while lifter holes are going in at right angle to road axis. Visible are the unit's mounted compressor and air and water tanks. Three-man crew runs the rig as well as bulldozer for clean-up.

Enough water is provided to form a thick mud in the drill hole which is kept "boiling" by the air.

The striking feature of the application of the drill on the Miller & Strong job was that a crew of three men with the drill and one bulldozer was able to advance the pioneer grade (roughly one-half the width of final grade) by the simple drilling of three to five horizontal holes longitudinally in the grade. These were heavily loaded and, after blasting, the bulldozer mucked clean the face for a succeeding round of 20 to 30 ft. This "preliminary cut" was at or below grade, never above, and therefore constituted that much of a completed roadway grade with nothing in the way of temporary construction having been done. No worker was required to leave the established roadway or to operate in any manner on the bank, and no hand work was done off the flat, stable permanent roadway. After the drilling for a round, there was nothing to pick up, and the crew just moved back for the blast with no ceremony or time loss.

A STRETCH of the "pioneer" road, 12 to 20 ft. wide. Rock banks range from 10 to 40 ft. high. At the start, there wasn't even a foot trail here.

Subsequent completion of the full width of roadway was accomplished by another set or sets of lifter holes drilled at right angles to the axis of the road into the bank. This brought the road both to grade and to width. During subsequent excavation by the shovel, practically all necessary sloping was accomplished in the one act.

A feature of the drilling was that no holes of less than 3-in. diameter were drilled, a good example of "hard-boiled drilling," possible because the crew was rigged so that they could afford to over-drill either in diameter of hole, hole spacing or hole depth.

The hard-boiled drilling on this job showed that it is a good partial substitute for other costs in blasting hard rock for excavation, such as the cost of excessive powder, expensive powder labor, springing, partial shooting and employment of additional equipment and its labor requirements. Hard-boiled drilling plus plenty of powder as needed turned out to be a good combination.

LIFTERS spaced at 3 ft. for completion shooting were of 3-in. diameter averaging 20 ft. deep. Crew didn't have to worry about over-drilling, whether on hole diameter, spacing or depth.



Semi-automatic filter plant boosts county water supply

ALL THE WATER they can use was scheduled to be made available to residents of the Contra Costa County, California, communities which lie east of the Berkeley hills on October 15, when the new \$600,000 Lafayette Filter Plant opened.

This new plant, built to replace the old Grant Miller Filter and Pumping Plants, has been designed to provide a 21,000,000-gal. daily capacity, and is capable of expansion to an ultimate capacity of 68,000,000 gal. of filtered water daily. Its construction by the East Bay Municipal Utility District was made necessary when average daily water consumption figure of 3,431,000 gal. for the area in 1952-1953 approached the old plant's maximum capacity of 4,000,000 gal.

Semi-automatic operation of the electrical equipment is a feature of the new plant. Recording devices in the central plant of the area will keep the operating crews aware of what's going on in the Lafayette plant without having to be there all the time.

Water for the area comes from the Mokelumne River through a diversion structure and two aqueducts. It flows into the Lafayette Plant through a 72-in. pipeline leading to the main filter building. Then it per-

colates down through seven layers of sand and gravel in the filter beds and enters small lateral pipes at the bottom of the beds. These pipes join in a 48-in. pipeline which carries the water, via gravity flow, to a 330,000-gal.-capacity clear water tank.

There are eight filter beds, divided into four units with two units on each side of the building, at the plant. Each unit is 21 x 30 ft., and each is filled with sand, gravel, and rock to a depth of 52 in. This filtering material, which is graduated in size, ranges from 4 in. of rock at the bottom to 30 in. of fine sand on the top. It took 26 tons of rock and gravel and 65 tons of sand to fill the filter beds.

Fine waste material is collected in this sand and gravel filter. It is removed by a reverse process wherein water from a 20-ft.-high, 200,000-gal.-capacity wash water tank flows through a 30-in. pipeline and is pushed up from under the filter bed. It takes 60,000 gal. of water to wash one filter.

Another 30-in. pipeline takes the waste water from the filter beds to a concrete regulating basin which is 70 ft. square and 13 ft. deep. It is released through an energy dissipator by means of a valve which controls the

rate of discharge to avoid flood and erosion damage near the plant.

The Lafayette plant will supply 14 tanks and reservoirs in the area by means of the Bryant-Colorados Pumping Plant, which has 4 pumps with a total capacity of 12,000 gal. of water per min. This is a fully automatic pumping plant. Another 30-in. pipeline will supply water for the almost-completed 19,000,000-gal. Leland Reservoir near Lafayette.

An emergency power plant has also been built by EBMUD for use in case of power failure from usual sources.

Elmer J. Freethy was the major contractor on the new Lafayette Filter Plant, construction on which started in June 1952. EBMUD personnel on the project included George Colby, senior civil engineer in charge of the construction inspection section, and Emeer C. Jorgensen, resident engineer. Design of the installation was under the direction of R. C. Kennedy, chief engineer, and Louis Bosa, senior civil engineer.

Four contractors took part in the construction of the entire project. The major job, construction of the Lafayette Filter Plant including the filter plant building, filter beds, wash water tank, and regulating basin, went to Elmer J. Freethy on a bid of \$400,000. Freethy also built the Bryant-Colorados Pumping Plant on a bid of \$79,535 and the Diablo Vista Reservoir on a bid of \$117,850. The first phase of the Leland Reservoir was undertaken by John Delphia on a bid of \$116,264. The second phase award went to Thomas & Sullivan for \$208,752. The emergency power plant was built by Bos Construction Co. on a bid of \$11,235.



PICTURING THE "INS" AND "OUTS" OF FILTER PLANT CONSTRUCTION

1—A LAYER of sand is poured into a unit of the filter beds. When the wash water rises to the top of the sand, it enters the troughs and is carried off.

2—THE FILTER PLANT under construction. The creek which carries off waste water is between building and highway.

3—INSTALLATION of piping which brings wash water to bottom of filter beds.

4—EXCAVATING for 30-in. line from wash water tank to filter plant.

5—REGULATING basin which controls discharge of waste water into the creek.

6—INSTALLING piping in the gallery of the filter plant below ground level. Large pipe is the 30-in. line from the wash water tank.

7—INTERIOR view of clear water tank showing inlet riser.

8—FROM the top of the new clear water tank are seen the new Bryant-Colorados Pumping Plant (right), the old Grant Miller Pumping Plant which it replaced (center), and the Lafayette Pumping Plant (left).



TIPS on WIRE ROPE

Wire rope sounds like it ought to be strong enough to take care of itself, but extra precautions pay off in longer life and better service all the way around. This article is intended to bring to the attention of the user of wire rope a few hints on its selection, use and care, so that it may be used to better advantage.

Supplementing this article is a list of literature which is available from various manufacturers of wire rope. Its only cost is the trouble of writing in for it. It goes into great detail and includes pictures, charts, tables of specifications, and written descriptions on all phases of buying, using properly, and maintaining wire rope. This article will just hit the high spots.

THE FIRST THING to understand about wire rope is what it consists of and the meanings of the terms used in its manufacture and operation. Wire rope is classified according to the number of wires twisted together to form each strand, the number of strands twisted around the core to form a rope, the type of core used, and the lay, which means the direction of twist or helical form in which the wire and strands are formed.

On most construction jobs, the wire rope used has 19 wires to the strand and 6 strands to the rope, although from 4 to 46 wires are used to a strand and from 3 to 18 strands to the rope. It all depends on the use specified by the purchaser or designed by the manufacturer.

Core

The core of a wire rope may be of either fiber or steel. Fiber cores are usually made from a hard fiber such as manila, sisal, java, or a mixture. Other materials used include cotton, paper, asbestos, or synthetic material. A core of hard fiber is usually laid up into a three- or four-ply rope. Steel cores are either wire-strand core or independent-wire-rope center. A wire-strand core consists of a single strand, usually of the same construction as the other strands in the wire rope. The independent-wire-rope core is really a separate rope, usually made of six 7-wire strands over which the main strands of the rope are laid. The core serves as a foundation for the strands, keeping the rope round and providing clearance between the strands for unrestricted movement.

This movement, and the fact that lubrication is necessary to keep wire rope in operating condition, has led

✓ Selection

✓ Use

✓ Care

to wire rope being regarded as a machine. The parts of the machine are wires, strands, and core. This machine is subject to the deteriorating forces of compression, tension, acceleration, abrasion, bending forces, and contact with equipment—in addition to the things which help to deteriorate other machinery.

Lay

The lay of a rope is another important consideration. It is described as either right, in which the strands pass from left to right across the top of the rope, or left, in which the strands pass from left to right. Wire rope is also either regular or lang lay. A regular lay rope is one in which wires are laid in strands in the opposite direction to the direction of the lay of the strands. A lang lay rope is one in which the wires are laid in strands in the same direction as the lay of the strands. Wire rope is usually right regular lay because this combination has the widest use and meets the requirements of most equipment. Therefore, if some other lay is desired it is necessary to so specify when ordering wire rope from the manufacturer.

Now you know all about the construction of wire rope and you're ready to order some for your particular job. Proper selection is, of course, all-important. Every wire rope is designed to resist a given type of destruction, with the result that it may lack resistance to another type of destruction. For example, few but heavy wires in the strands make a rope that withstands abrasion for a long time but fails from bending more quickly. A rope made from many small wires resists bending but is subject to abrasion in a short time. The longest service from a rope will result from the correct compromise of resistance characteristics to meet the destructive forces present in the particular situation.

Consider the load!

The most important consideration in buying wire rope is the load the



GOING DOWN (or up), this is no time for poor wire rope performance!

rope will have to carry. It is seldom advisable for the working load of a wire rope, especially a running rope, to exceed 1/5 of the breaking strength, which means the minimum safety factor should be 5. However, individual circumstances should rule here also. A minimum safety factor can range from 3 for static ropes and strands for guying up to 10 for hot ladle cranes.

So the proper safety factor should depend on the loads applied, the speed of operation, the type of fittings used for securing the rope ends, the acceleration and deceleration, the length of rope, the number, size, and location of sheaves and drums, the factors causing abrasion and corrosion, the facilities for inspection, and the danger to life or property should a rope fail. In addition, wire ropes operating under low safety factors deteriorate much more rapidly than properly loaded ropes due to fatigue

a bending over sheaves, which shortens rope life.

No order for wire rope is complete without the length being specified. Even though the equipment may be standard, the user often finds that a few extra feet on the length works out to his advantage.

Preformed rope

Another factor for the buyer of wire rope to consider is whether or not to buy preformed rope. The process of preforming is the reshaping of the wires and strands into the exact shapes they will take in the finished rope. Because of this, the wires and strands of the preformed wire rope are free from internal stress and strain, and there is no tendency for the rope to open up even when not held securely. It is recognizable as a rope which remains more limp and neutral than an ordinary rope.

Because preformed rope is free from internal stress, it is easier to handle and faster to install and has no tendency to loop or kink. It has less tendency to rotate, spools better, handles shock loads better, holds its compact body longer, lasts longer under bending conditions, and is safer to handle when worn. Two drawbacks to preforming, however, are that it adds to the cost of the rope and that it doesn't increase resistance to external abrasion. Therefore, the extent to which abrasion is important in a particular use of wire rope governs how economical its use will be.

The type of core to choose is important too. Under normal operating conditions, a fiber core will provide adequate support for the strands, since the primary purposes of the center member are to support the surrounding strands, to keep them equally spaced, and to prevent them from bearing upon each other forcibly. It also serves as a cushion to relieve the shock of impact loads. However, there are cases when the rope is used under conditions of intense heat, when considerable overloads are frequent, or when compression stresses (such as overwinding on a drum) are so severe that fiber cannot withstand them. Then, a rope with either steel-strand or independent-wire-rope core is better.

Lang lay

The lay of the rope should be specified whenever it is ordered. When it is not specified right lay rope is furnished. For most construction equipment, such as scraper carrier ropes, bulldozer ropes, dragline ropes, hoist lines on shovels, dredge lines, and the like, lang lay is recommended as being more satisfactory than regular lay. This is because lang lay ropes are about 15% more flexible and have a wearing surface per wire about 3 times that of regular lay. Because lang lay rope has a greater length of wire exposed on the crowns and be-

Available free literature on the selection, use, and care of wire rope

The following literature may be had free by filling out and mailing in the coupon on page 139. Be sure to use the key numbers to identify the items you want.

Key Number	Title	Identification Number	Manufacturer
1101	Here's How to Keep Your Wire Rope Working	—	American Chain & Cable Company, Inc.
1102	The Right Rope for the Job.....	—	American Steel & Wire Co.
1103	Specification Data	—	American Steel & Wire Co.
1104	Wire Lines for Oil, Gas, and Water Wells	—	American Steel & Wire Co.
1105	Valuable Facts About the Use and Care of Wire Rope	—	American Steel & Wire Co.
1106	Wire Rope for General Purposes.....	241B	Bethlehem Pacific Coast Steel Corp.
1107	Wire Rope	—	Broderick & Bascom Rope Co.
1108	Riggers' Handbook	—	Broderick & Bascom Rope Co.
1109	Know Your Ropes.....	—	The Colorado Fuel and Iron Corp.
1110	Wickwire Rope	—	The Colorado Fuel and Iron Corp.
1111	Edwards Wire Rope.....	—	E. H. Edwards Co.
1112	Wire Rope Use and Abuse.....	—	E. H. Edwards Co.
1113	Splicing and Fitting.....	—	E. H. Edwards Co.
1114	Wire Rope Data and Tables.....	—	E. H. Edwards Co.
1115	Wire Rope Is a Machine.....	—	Jones & Laughlin Steel Corp.
1116	Centerfit Wire Rope.....	—	Jones & Laughlin Steel Corp.
1117	Wire Rope Handbook.....	R-51	A. Leschen & Sons Rope Co.
1118	Use and Care of Wire Rope.....	C-51	A. Leschen & Sons Rope Co.
1119	Leschen Slings and Fittings.....	FS-52	A. Leschen & Sons Rope Co.
1120	Macwhyte Wire Rope.....	G-15	Macwhyte Co.
1121	Slings for Industry.....	5308	Macwhyte Co.
1122	General Wire Rope Recommendations for Contractor's Equipment.....	—	Macwhyte Co.
1123	Engineering Data for Wire Rope Users	—	Pacific Wire Rope Co.
1124	Rigging, Splicing, and Socketing.....	—	Pacific Wire Rope Co.
1125	Wire Rope Calculator (A pocket-size celluloid slide card giving sizes, prices, and tolerances).....	—	Pacific Wire Rope Co.
1126	Rope Dope Educational Bulletins (A folder containing 14 separate pamphlets on the handling and care of wire rope)	—	Union Wire Rope Corp.

cause it has a greater arc than the same length of regular lay rope, the outer wires suffer less fatigue from bending over small sheaves. Rope failure from wire breakage is thus greatly delayed by use of a lang lay rope.

Due to the tendency of lang lay to untwist under load, it should be used only where both ends of the rope are fixed with no opportunity to untwist. A disadvantage of lang lay is that it is more easily crushed and flattened than is regular lay rope, making it unsatisfactory for use where there is overwinding or poor winding conditions on the drum.

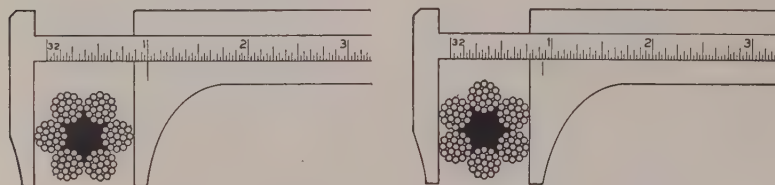
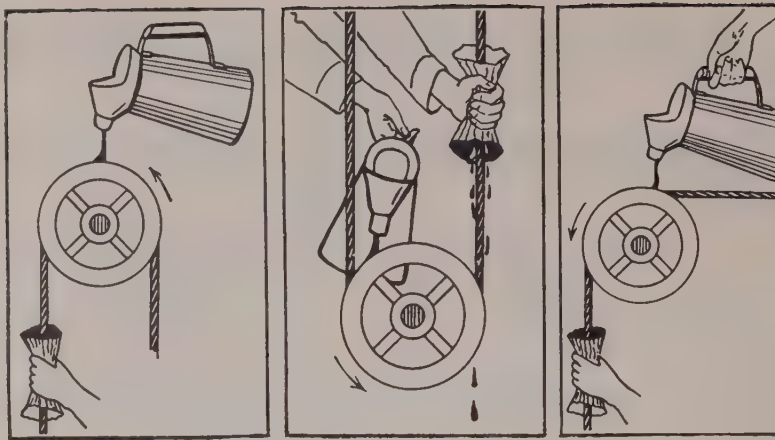
Left lay rope is used most generally in the oil fields on rod lines to prevent unscrewing rods due to untwisting of the rope. The untwisting of a left lay rope would tighten, rather than unscrew, the couplings on the rods. Construction use of a

left lay rope could be to use it in a pair with a right lay rope as holding and closing lines on a clamshell bucket, the opposition of lays preventing undue spinning of the bucket.

Diameter

What should the diameter of your new rope be? To find out, select the smallest sheave or drum to be used with the new wire rope and measure the actual diameter of the groove. The groove diameter should never be less than the actual calipered diameter of the new rope, always remembering that the true diameter of a wire rope is the diameter of a circle which will enclose it.

Grooves in sheaves and drums should be slightly larger than the rope in order to avoid pinching and binding of the strands and to permit the rope to adjust itself to the radius of curvature. Tight grooves result in



HERE'S HOW to keep your wire rope working, says American Chain & Cable Co., with its handbook illustration (top) of how to lubricate a moving line: Stay beyond the sheave.

PICTURES BEAT WORDS for Wickwire Spencer too, especially when explaining (bottom) how to measure wire rope diameter. Correct procedure gives greatest dimension, as shown at left.

excess wear and rapid deterioration of the rope. Grooves should be checked regularly. When found to be worn, sheaves should be re-grooved or replaced. This is particularly important when installing new rope on old equipment, because new rope will undoubtedly be somewhat larger in actual diameter than the worn rope it replaces. Also, the bottoms of the grooves may have become worn to the diameter of the rope which was removed.

Unreeling

Now you're ready to put your rope to work. A wire rope can be ruined before it ever comes off the original shipping reel. By bumping it into something, dropping it, or lashing it with chains, you may get mashing, distortion, or other damage. Any metal-to-metal contact, especially, will take life out of the rope before its service ever starts.

When removing wire rope from the reel on which it is received, it is imperative that the reel or coil rotate as the rope unwinds. Attempts to unwind rope from stationary reels will result in kinking, and even though the kink may be straightened so that the damage appears slight, the relative adjustment between the strands has been disturbed so that the rope cannot give maximum service. When uncoiling rope, always roll the coil like a hoop. Never lay it down flat and throw the rope out in loops. If this is done, kinks are liable

to form and the rope will become twisty as well.

When installing wire rope, proper alignment between the sheaves is essential to avoid rope abrasion and sheave wear. If possible, avoid reverse bends, which seriously shorten the life of wire rope. It is the application of bending forces, first in one direction and then in another, that fatigues rope rapidly. If reverse bends can't be eliminated, some relief can be obtained by keeping sheaves as widely separated as practical and of greater diameters than minimums recommended.

Rope travel across the face of the drum makes it impossible to have the head sheave and the drum perfectly aligned. This difference in alignment is called the fleet angle. For most economical service, the fleet angle should not exceed $1\frac{1}{2}$ deg.

Breaking in new rope

It is always advisable to run a new wire rope with a light load or with no load for a short period after it is installed. This breaking in process gives the component parts of the rope an opportunity to adjust themselves to the conditions under which the rope is to operate, and this time spent at first will pay off in extra useful rope life.

Now your rope is ready to go. Avoid jerks when applying the load. They are fatal to many lines. Constant speed, careful operators, and gradual application of load are all

proved means of getting the greatest amount of service from the line. Remember that the rate of acceleration places definite stresses on the rope.

Maintenance begins immediately

Maintenance of your wire rope should start the moment it comes into your hands. Don't wait for a failure to occur before examining your rope. Look it over at regular intervals. Close examination will not only indicate when it's time to put on a new rope but it will also reveal many things about whether or not your rope is suited to the job. For instance, wires breaking without showing wear indicate that bending is excessive, sheaves and drums are too small, or the rope construction is too coarse. Rope crushing or flattening indicates too much pressure, improper winding, or a rope not constructed to withstand the conditions of the job. Whole strands or the entire rope breaking soon after installation means overloading or indicates the need for a stronger or larger diameter rope. Thus regular inspection will enable you to detect many enemies which you can overcome at a saving in rope cost.

When the rope is put to work, abrasive, corrosive, and fatiguing forces combine to cause loss in strength. They may be normal forces or they may be more severe because of poor design or equipment, surrounding conditions, lack of care by the operator, or incorrect handling. Whether or not the damage is excessive, your job is to locate the source of wear and take steps to eliminate it or reduce it to a minimum.

Abrasion

Abrasion of a wire rope is the wearing away of wires due to contact with other wires, parts of equipment, or abrasive elements. Nicking, scarfing, and scrubbing are often called abrasion. Inspection of outer wires will show exterior abrasion. The diameter of a rope showing abrasion should be gauged at its points of greatest wear: Part of the loss of diameter may be due to compression of strands on the core or to lengthening of lay. However, it is helpful to estimate the extent to which outer wires are worn away because they represent part of the rope strength. If abrasion is spotty, the cause is most likely improper operation. Nicking, scarfing, and scrubbing are frequently caused by improper spooling, so see that the line is started from the proper drum flange and avoid overwinding (placing more than one layer of rope on a drum) if possible.

Fatigue

Fatigue is the term commonly applied to progressive fracture of the wires of a rope, and corrosion is the chemical decomposition of the wires

Concluded on page 94

MORE COMMENTS ON SPECS FOR BETTER CONCRETE

Wet mixes, properly used, reduce effort and give better results

THE WRITER has read with interest the articles "Two Viewpoints on Specifications for Better Concrete" by Messrs. Schrepferman and White in the July 1953 issue of *Western Construction*, and the discussion by Messrs. Hobbs and Naumann in the September issue. About two years ago I prepared the article "Confusion in Concrete" that was published in the December 1951 issue of this magazine. The discussions of that article appeared in the March 1952 issue. Those discussions were very critical of the use of "relatively wet concrete for most structural purposes." No one who would sign his name appeared to agree that relatively wet concrete was ever needed or desired. An anonymous "Sidewalk Superintendent" did report that he saw a "gruel-like mix" used.

Mixes should be wetter

It is a pleasure to enter into this discussion in an effort to support Mr. Schrepferman. "How wet should concrete be mixed" is a very important question. Many people believe it should be only wet enough to be put in place with a good looking surface. Surface appearance is important, but of far greater importance is the proper cover for and bond to the reinforcing steel. Concrete must have more "slump" than is required for good looks if it is to properly encase the steel and form a bond rather than a void on the underside of horizontal reinforcing bars.

Robert White writes (in his book "Our Virgin Island") that: "Building the house on top of Marina Cay was somewhat less than fun. In all we mixed about 600 beds of concrete and John and I argued about every one of them. This argument must have started with the invention of cement. The engineer wants it dry and the man mixing it wants it wet because it's easier to mix."

You have all seen the advertisement of the Ready Mix Concrete

By **GEORGE CONAHEY**

Training Specialist
U. S. Navy Civil Engineers Corps
Officer School
Port Hueneme, Calif.

The opinions and assertions contained in these comments are of the writer, and are not to be construed as official or reflecting the views of the Navy Department or Naval Service at large; furthermore, the opinions and recommendations advanced by the writer are not necessarily those of the Bureau of Yards and Docks, since the methods to be used for preparing the specifications for concrete, as well as mixing and placing concrete, are open for discussion.

Plant that reads: "Good concrete is made by mixing cement, sand and gravel or crushed stone with water. Poor concrete, oddly enough, is made of the same components. The differences between the two are the intangible things called 'integrity' and 'know how.' Shall we be more concrete?"

Making good concrete is still an "art." In spite of all the research performed and information developed, no one has found a way to transform this art into a science. It is still necessary to have the proper skills, good judgment, integrity and willingness to put forth the necessary effort in order to make good concrete. Relatively wet mixes, properly used, reduce the effort required and assist the workmen in performing a better job.

Slumps to fit the job

Mr. Schrepferman states: "The architect or engineer can do much to eliminate personnel failures by analyzing his slump requirements and then stating them to fit the job conditions. For example a 2- or 3-in. slump is adequate for most foundations, heavy walls and (if cement fin-

Disagree? Want spec improvements? Tell us.

THIS IS THE THIRD set of comments presented this year in *Western Construction* discussing the needs and problems in writing better specifications to control concrete for buildings. The first, presenting the viewpoints of a contractor and a designer in the July 1953 issue, posed the problems and possible improvements. The second, in the September 1953 issue, included a plea for realistic compromise of the viewpoints where they differed, and pointed out ways this could be accomplished effectively.

This month, two specialists, both of whom are well acquainted with design problems and field methods,

make valuable suggestions that should be noted by both designers and contractors. Mr. Conahey proposes some definite changes and has carefully written a suggested new form of specification. Mr. Collins calls for increased training of the men who are to produce concrete and for an up-dating of specs to cover precast work realistically.

It is hoped that space devoted to this subject by *Western Construction* will provide a stimulus toward the improvement of specifications for better concrete. Your comment is invited. Address Editor *Western Construction*, 609 Mission Street, San Francisco 5, Calif.

ishers will work the material) many flat slabs. However, for thin wall sections and heavily reinforced columns and beams, it may be necessary to increase the slump to 5 or 6 in. and reduce the maximum size of the aggregate."

Acceptance of 6- and 7-in. slumps

In spite of what many may say or believe, this same statement has been presented on many occasions and accepted as the basis for good concrete practice. D. A. Abrams in Bulletin No. 9 of Structural Materials Laboratory in 1921, "Quantities of Materials for Concrete," shows the mixes with 6- or 7-in. slump in bold face type. It is not stated, but it is believed this was done because these mixes are the ones most often used on structural work. He did however state on page 9 of the bulletin as follows:

"2. The concrete must be plastic or workable. Too great reliance should not be placed on the slump test alone. If the concrete does not work into place or finish properly, the proportion of fine to coarse may be adjusted as required, so long as the quantity of water is maintained at the value given at the head of the table. Note this quantity includes water contained in the aggregate. Absorption of aggregate can generally be neglected.

"3. Where it is not practicable to exercise control over the consistency of concrete, the proportions and quantities in BOLD FACE type, for slump of 6 to 7 inches, should be used."

The next reiteration of this statement is found in Table 4 of the Report of the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete. This table is reprinted as follows:

Portion of Structure	Consistency — Slump		Maximum Size of Coarse Aggregate in.
	Max. in.	Min. in.	
Reinforced foundation walls and footings	5	2	1½
Plain footings, caissons and sub-structure walls....	4	1	2
Slabs, beams, and reinforced walls..	6	3	1
Building columns..	6	3	1
Pavements	3	2	2
Heavy mass construction	3	1	3 to 6*

*In making the slump test, all aggregate larger than 2 inches should be screened out of the mixture.

This same table is copied as Table No. 3 in "Design of Concrete Mixes" of the American Concrete Institute (ACI 613-44), and as Table No. 6 in the ninth and tenth editions of "Design and Control of Concrete Mixtures," a pamphlet of the Portland Cement Association. These are the reports referred to by Mr. Hobbs.

More often than not it is not practicable to exercise precise control over the consistency of concrete placed in structures because of the relatively small quantity of concrete required at a time. Because of this the mix should be proportioned for the use of a 6- to 7-in. slump. Usually a better looking and more satisfactory job will result. Such proportioning will increase the cement content but the cost of placing will be lowered and a better appearing job will be provided with proper bond to the steel, as well as adequate concrete strength and durability.

Combining methods

Mr. White points out that "four methods of specifying concrete are in general use." The accompanying specification is offered as a combination of the first three methods he discusses. It will permit the contractor with the "integrity" and "know how" to make and place the good concrete he knows how to produce. It still has enough of the other points required to keep the contractor without the "know how" under control.

SUGGESTED SPECIFICATIONS FOR CONCRETE

1. **General.** The work consists of mixing, conveying, placing, compacting and curing the reinforced portland cement concrete for the structural parts of the Building as shown in the plans.

2. **Composition.** The concrete shall be composed of portland cement meeting standard specification A.S.T.M. Designation C150-52: fine and coarse aggregates meeting standard specification A.S.T.M. Designation C33-52T and water that is suitable for drinking. Aggregates shall have a maximum size of one (1) inch and be from a source that has been proven satisfactory by at least five years use in concrete or that has

been approved for use in state highway construction. The fine and coarse aggregates shall be proportioned by weight to have approximately forty (40) percent by volume of the material pass the one-quarter (¼) inch screen. Water shall be added to provide not less than a three (3) inch slump nor more than a seven (7) inch slump in accordance with the standard specification A.S.T.M. Designation C143-52,

or Kelly Ball penetration of not less than one and one-half (1½) inches nor more than three (3) inches.

3. **Cement Content.** Concrete placed in the footings or underground shall contain not less than five (5) sacks of cement per cubic yard of concrete. The concrete for the floor slabs, beams and columns shall contain not less than six sacks of cement per cubic yard of concrete. Concrete for special sections heavily reinforced girders, beams and/or columns shall be in accordance with notes on the plans.

4. **Admixtures.** Special materials to increase the workability, reduce water permeability, cause air entrainment, increase the rate of setting and hardening or reduce the mixing water required may be used in accordance with the specifications of a recognized National Technical Society, or when approved by the architect or structural engineer.

5. **Preparation.** The concrete may be prepared by mixing, for not less than one and one-half (1½) minutes, all ingredients of a batch, in a batch type or concrete mixer approved by the Association of General Contractors,

or: The concrete may be supplied ready mixed in accordance with standard specification A.S.T.M. Designation C94-48.

6. The concrete shall be conveyed placed and cured in accordance with Recommended Practice and Standard Specifications for Concrete and Reinforced Concrete, report of the Joint Committee of the National Technical Societies, Sixth Printing 1949. All concrete shall be compacted by internal vibration.

Needed: special training, up-dating for precast, w/c ratio safeguards

By F. THOMAS COLLINS

F. Thomas Collins & Associates
Engineering and Construction Consultants
San Gabriel, Calif.

IN REGARD to the viewpoint of I. C. M. Schrepferman of Brown-Schrepferman & Co. toward practical concrete, I am inclined to agree with his viewpoint, as long as the general contractor producing the concrete is the Brown-Schrepferman & Company or equal. It is when the control of the concrete passes into inferior hands that I start to worry and am, therefore, tempted to write specifications as per Kenneth R. White. But even when the specifications are written as per Mr. White, the concrete control is pretty much in the hands of the

man on the job so the writing of elaborate specifications has been in vain. What then is the answer?

Special courses?

The answer is not to be found in better specifications, or trick additives, or in leaving it up to the contractor entirely. It is to be found, I believe, in a combination of these plus responsible job supervision by a qualified person, from either the contractor's or engineer's organization. This person must be allowed to change the mix to suit the conditions but he must be qualified to do this. This requires more "schooling" of contractor superintendents, and more job supervision by engineers.

None of the trade schools have had the practical type of courses in "Prac-

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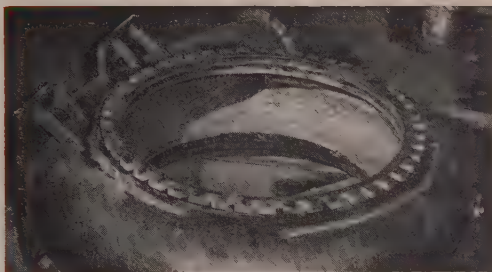
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tical Concrete" to fill the need; the colleges and universities have not filled the need; organizations such as the Portland Cement Association have not filled the need. Who then is going to fill this need? Private courses employing the best minds, both for builders and engineers, seem to be one answer. Tuition for such courses must be higher than the university classes but it is evident that the additional cost will be well worth it, if practical concrete meeting with both engineers' and builders' approval is the result.

Some areas have special problems that are largely associated with the water/cement ratio. Let's assume that

the specifications call for a 3-in. slump and that the finishers and placing men cry for more water and, in many cases, more water is added. It must be recognized that **the man on the job is going to change that water/cement ratio to suit his placing.** You can lock the water valve on the truck, etc., but they will still find a way to get more water into that concrete mix. A suggestion, then, is to use a vermiculite additive of 2 cu. ft. of stabilized No. 4 vermiculite aggregate (about No. 30 mesh). Water is added at the plant to bring the slump to 5 or 6 in. or less if the field crews will work it with less. The vermiculite aggregate acts as small individual sponges, adding

workability to the mix and retaining the water for hydration of the cement.

This procedure has been tried and has been found to work, especially in very hot, dry climates where surface cracking of floors and precast wall panels is a great problem. Recent tests show that the strength is improved and it is believed that the tensile strength and durability of the concrete is also improved.

Control of precast wall panels

With the rapid increase of "tilt-up" construction, many contractors are finding additional problems not encountered in poured construction. One of these is the need for high early strength for erection purposes. Many of the new contractors doing tilt-up for the first time are erecting panels before they have gained adequate strength. The answer is not in more strongbacks, but in higher concrete strengths at the time of lifting.

The use of larger size aggregate is recommended, 1½ in. to 2 in. if available. In cold weather the addition of calcium chloride, not to exceed 2% of the cement content, can be used. There are other additives that will increase the early strength, but they should be used with caution. Proper curing and even steam curing for the first 12 hours is now to be recommended. For thin shell roof sections such as channel slabs, steam curing with portable steam generators and treated canvas tarps is almost a "must" to free the forms for the next day's production. Drying must then be controlled in the yard to insure proper curing without curling or warping.

Formwork

In regard to the problem of detailing formwork for conventional poured concrete, this is usually left to the contractor unless there is something unusual that requires special engineering analysis. For precast concrete, the methods are not conventional and the know-how is not general, or being taught by the trade. The know-how for this type of forming is best handled by special classes, or alternate forming details shown on the drawings by the engineer, provided the engineer himself knows how it should be done. In the near future, the forming for precast will be standardized and can be left up to the general contractor.

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A \$10,000,000 revenue bond issue will be submitted to the voters in the Imperial Irrigation District, Calif., for financing construction of a power plant at Pilot Knob on the Colorado River. This bond sale was approved by the California District Securities Commission after noting that authority to construct the project was given by state and federal governments.

If your jobs are rough on tractors...see why
you need a lubricant that's specially
made for track roller bearings...

SHELL TRACROL LUBRICANT

IN DUST

In dust, ordinary lubricants are quickly contaminated. Tough-bodied Shell Tracrol Lubricant seals out dust, dirt, sand and mud; protects against wear long after ordinary lubricants have become harmfully abrasive.



IN WATER

In water, ordinary lubricants are "watered down," lose body, or are flushed away. Water-repellent Shell Tracrol Lubricant resists dangerous scouring and keeps right on protecting vital bearing metals even after continuous immersion in water.

SIDEHILL LOADS

On sidehill loads, ordinary lubricants are squeezed away from vital bearing surfaces. Adhesive, squeeze-proof Shell Tracrol Lubricant sticks, stays and protects even under extreme pressure from sidehill loading and extra heavy power demands.



Whether your jobs are rough or easy
on tractors...it pays to use
the lubricant that's specially made
to protect track roller bearings...



SHELL TRACROL LUBRICANT

On Big Eildon Dam construction in Australia—

Utah is fighting mud with mud



GOOD PROGRESS has been made by Utah Construction Co.'s forces on the Company's contract to construct the Big Eildon Dam near Melbourne, Australia (*Western Construction*—June 1952 p. 125), according to W. S. Byrne, the project engineer. An earth and rockfill dam, when completed it will be the largest of its kind in the Southern Hemisphere. It is believed to have the second largest diameter steel tunnel lining in the world.

More rain than shine

Utah is learning to build a dam in the mud—or else! The current winter program calls for the excavation and hauling of a quarter million cu. yd. of rock to the dam every month, rain or shine—mostly rain. A program such as this without due regard for weather calls for rearranging your thinking in terms of transporting even rock over steep grades and through a continuous ooze of Victorian mud. It does stop raining oc-

casionally but it rarely ever dries up; as a matter of fact it may be shown that the process of drying up slows down the operations.

The wetter the better

Of the more than 5,000,000 cu. yd. of rock to be excavated, all is of silurian origin and the major portion consists of mudstones and siltstones occurring in beds from a few inches to several feet thick. This type of rock and particularly the weathered portions when mixed with a generous portion of rain water and the grinding of heavy loads furnishes a continuous supply of thick slurry-type mud. As long as it continues to rain, the gravel topping on the roads furnishes a good grip for tires and loaded Eucs, both bottom dump and

end dump, are able to negotiate the grades with ease and without help. Between the sporadic rains however, this same slurry-like mud assumes the consistency of a good grade of axle grease and in a matter of an hour the hauling fleet of 18 to 24 Eucs are piled up on even the slightest grades.

Watering grades between rains

It was during one of these frequent semi-dry periods that one of the Australian excavation foremen complained to his American superintendent, Paul Hatch, and suggested that the now dormant water tank trucks be brought out and water the roads on the steeper grades between rains.

The primary stage of the earth embankment has been raised 135 ft. above the foundation and with the present rate of rock excavation the rock fill will soon exceed this level. Excavation of the 300-ft. deep spillway cut is well over half completed and concrete work in the chute and bucket section is being hurried along. The 1,250-ft. long power tunnel has been driven and all but 150 ft. of the 23-ft. diameter steel lining has been welded and concreted in place. The intake tower at the inlet end of the tunnel has been raised 110 ft. of its ultimate 220-ft. height. A plan has now been devised to divert the river and make the reservoir closure during the next season and thus eliminate the necessity for an expensive upstream cofferdam, all of which will make next year a very important one on the Big Eildon Project.

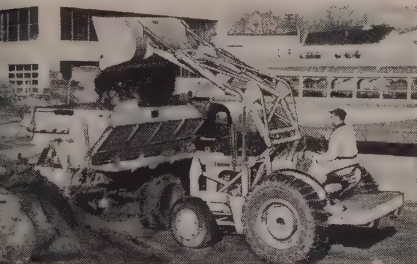
On the human side the 26 Americans have dwindled to 22. The Australians are developing into first-class construction men and have taken over many important spots in the organization.

ABOVE: Big Eildon's embankment has risen 135 ft. above the foundation, but below at left is pictured normal working conditions during winter rains. Rock excavation is going on. When rain stops, roads are kept wet anyway (right).



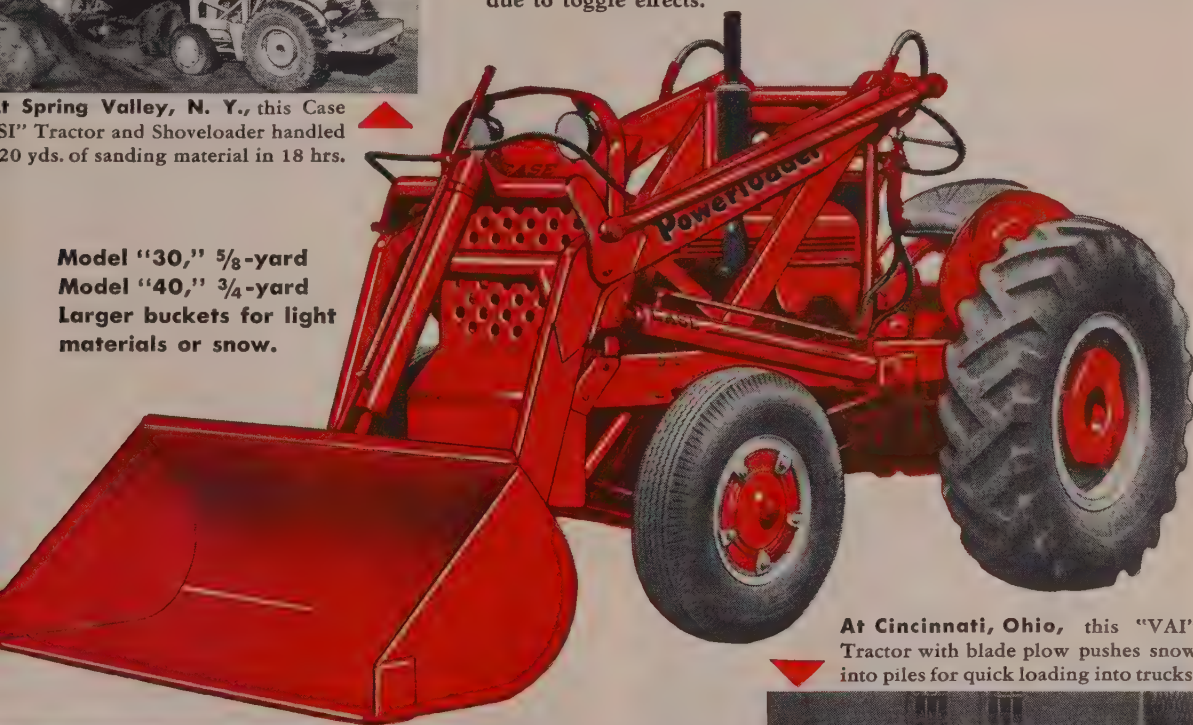


At Minneapolis, Minnesota, this Case "LAI" Tractor and Shovel loader helped dispose of a 24-inch snowfall.



At Spring Valley, N. Y., this Case "SI" Tractor and Shovel loader handled 20 yds. of sanding material in 18 hrs.

Model "30," $\frac{5}{8}$ -yard
Model "40," $\frac{3}{4}$ -yard
Larger buckets for light
materials or snow.



At Cincinnati, Ohio, this "VAI" Tractor with blade plow pushes snow into piles for quick loading into trucks.



At Dayton, Ohio, municipal airport, this Case "VAI" Tractor and broom sweep snow from loading area. Other Case-powered snow equipment includes sidewalk, mold-board, and V-type plows.



CASE

Superior Equipment Co., Phoenix, Ariz.; Contractors Machinery Co., San Francisco, Calif.; Growers Tractor & Implement Co., Sacramento, Calif.; Electric Tool & Supply Co., Los Angeles and San Bernardino, Calif.; Equipment Sales & Service, Stockton, Calif.; Liberty Truck & Parts Co., Denver, Colo.; Western Equipment Co., Boise and Idaho Falls, Idaho; Hilton's, Inc., Las Vegas, New Mexico; Foulger Equipment Co., Salt Lake City, Utah; Montana Powder & Equipment Co., Helena and Billings, Montana; Columbia Equipment Co., Portland, Ore.; Star Machinery Co., Seattle, Wash.

HOW IT WAS DONE...

Concrete chute handles log traffic past Idaho dam

A PROBLEM situation was quickly alleviated early this year by Albeni Falls Dam on the Pend Oreille River in northwestern Idaho. With the dam substantially completed, no way had yet been provided for logs to get past the dam on their way to downstream sawmills. So the Seattle District, Corps of Engineers, issued bid invitations for "Construction of Log Tunnel and Flume."

All bids received for opening in February, 1953, were rejected as too high. Therefore, a contract was negotiated with Albeni Constructors, already on the job building a powerhouse, to install the log chute for \$90,943.

A FLOTILLA of logs could glide downstream through guide beams towards the tunnel intake and chute through Albeni Falls Dam on the Pend Oreille River.



Work on the log chute was begun about March 10 and, except for delivery of downstream gate-operating machinery, was completed about the middle of June.

The reinforced concrete trough is 450 ft. long, 6 ft. wide, and 10 ft. deep, including a tunnel through the rock island on which rests the dam's non-overflow section between the spillway and the powerhouse. It is designed to permit passage of logs in the upper 7½-ft. range of the pool elevation—that is, when the forebay is at any elevation between 2,055 ft. and the maximum required elevation, 2,062.5 ft.

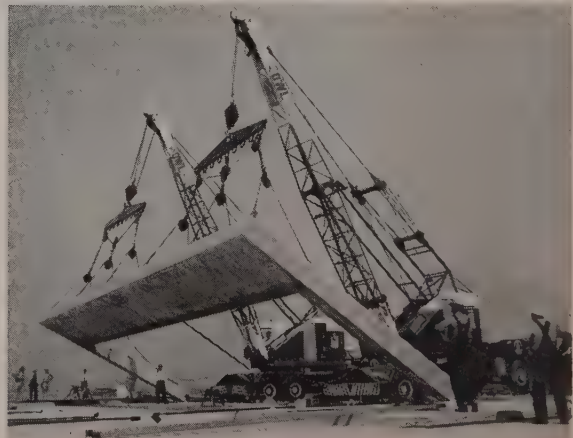
Two thousand cubic yards of granite rock excavation included 200 cu. yd. of tunneling. Another 2,000 cu. yd. of loose rock were removed. A total of 615 cu. yd. of concrete were placed in the tunnel and chute. The 50-ft.-long rock bore is reinforced-concrete lined throughout.

The chute is equipped with a vertical-wheeled 8 x 12-ft. steel intake gate, operated by the powerhouse gantry crane. It has a 6 x 16-ft. inclined steel check-gate near the downstream end, which is operated by its own independent hoist.

A system of guide booms was installed to direct logs into the intake of the tunnel. As the reservoir level rose under natural conditions this spring, first use was made of the tunnel and chute by logs rafted through Lake Pend Oreille from recent sales of national forest timber on the Clark Fork watershed, and also by logs brought in by rail from central Idaho and dumped into the Albeni Falls Reservoir for delivery to mills downstream.

A 58-ton "catch" is a big haul in any man's language

THERE GOES the largest pre-cast concrete wall section ever hoisted into place. This 58-ton section and two others, each 62 ft. wide x 27 ft. high with hangar-type door openings 58 ft. wide and 18 ft. high, are being used in construction of North American Aviation, Inc.'s new facility in Los Angeles. When complete, the building will contain 126,000 sq. ft. of floor space on 8½ ac. of ground, including 150,000 sq. ft. of paved yard. The building was designed by the office of George V. Novikoff, design engineer, to specifications of North American's industrial engineering dept. General contractor for its construction is Coordinated Construction, Inc.





more **WORK**
in a **WEEK**

with **CAT***
equipment

Moving earth for an underpass on the Ramona Freeway, near Ontario, California, Contractor J. A. Payton uses Caterpillar DW21 Tractors and No. 21 Scrapers.

The big yellow rigs haul average loads of 14 bank yards. They load in one minute, spread in 10 seconds, and make the 2-mile round trip in 9 minutes. That's good cycle-time for any earthmoving unit.

But what shows up on the profit sheet is the fact that the DW21s keep up *that* pace 10 hours a day and 6 days a week.

No matter how fast or powerful your rig may be, it's not making money when it's in the yard for repairs. Mr. Payton says: "I don't buy equipment because I like to stand and look at it. I buy it to use and make money with, and when a machine is down it's losing money. I know any piece of equipment will wear out sometime, but when it does I

want a dealer who can give me service and keep it running. In Caterpillar machines and dealer service I get most for my money."

If you want proof that a Cat DW21 rig will turn out more work at a bigger profit over any extended period of time, your Caterpillar Dealer can give it to you. Ask him for a demonstration on your own job!

Caterpillar Tractor Co., San Leandro, Cal.; Peoria, Ill.

CATERPILLAR*

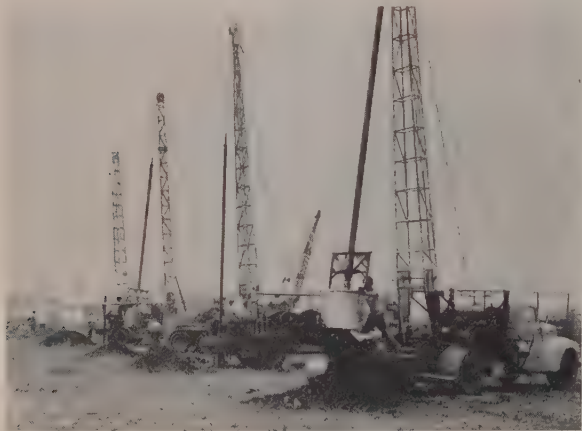
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**NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE**

HOW IT WAS DONE...

Poor foundation material no jinx with adequate drilling methods

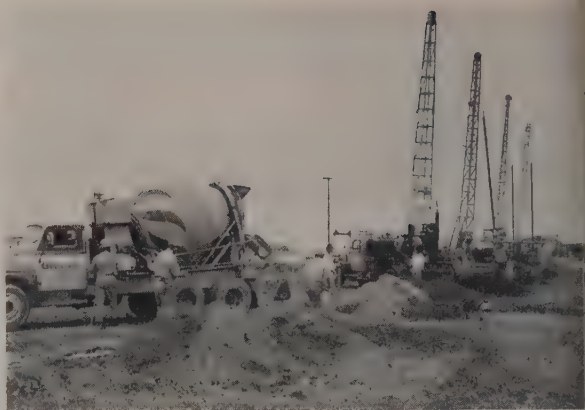
HITTING rock bottom—well, anyway solid ground—can sometimes be an expensive headache when one is faced with a tight schedule for sinking footings in poor foundation material. MacIsaac & Menke Co. were confronted with this malady when they had to tackle the foundations for a \$500,000 plant annex which they are building for a



A BATTERY of specially-built rotary drilling rigs is shown sinking foundations. Six of these drills work adjacently and simultaneously. As each rig completes its drill of 30 ft. or more, water is run into hole and left to stand overnight. This acts as a binder on the sand at the bottom. Next morning the drills go to work belling out the sand bottom and concrete then is poured immediately. The rigs have 20-ft. booms and are mounted on 1/2-ton Chevrolet trucks.

manufacturer in Los Angeles. Site of the new building was formerly owned by a firm which used the property as a source for sand. Subsequent re-filling of the land had been done by dumping all kinds of refuse into the sand excavations.

Starting out the job MacIsaac & Menke conducted several experiments which got them nowhere. In the first attempt to penetrate the layers of refuse and reach the



HERE is one of the Graham Bros. concrete trucks pouring foundation footings. Its arrival is timed to coordinate exactly with the belling out of sand at the bottom of the penetrations. The truck is a 1953 International mounted with a 5-yd. mixer.

sand bed below, a 24-in. drill rig was used. But the large chunks of junk which were encountered rendered this drilling equipment ineffective. On a second stab at the problem the contractors tried out a crane with which they attempted to excavate 30 ft. Unfortunately the refuse crumbled easily, making the operations impractical.

By this time knowledge of soil conditions indicated that a drill large enough to gather up sizeable chunks of refuse might be feasible. Consequently, a 30-in. drill was put to work and it proved to be effective in making penetrations down to 35 ft. For bringing up larger pieces an orange peel bucket was used and a regular sized bucket handled the rest. In the case of extra large pieces, a 30-in. steel ring or casing was used to shore up the walls of the hole, enabling a man to go down with an air hammer and break up the material. In some areas soil was so loose that cave-ins developed in several holes at various levels. Clay soil was then imported and tamped into the holes to form a binding arch to hold the fills in position.

Once successful methods of providing a solid foundation for the building were established the contractor found it best to apply as much equipment as practical for the size of the area. A total of 67 penetrations have been made and because of a well-handled schedule of closely coordinated operations the job is getting done at a surprisingly low cost.

For the building owner, Richard R. Bradshaw is structural engineer. The architect is Kenneth H. Neptune.

Loader — with wings — handles 9-ft. windrow

HANDLING an extra-wide windrow effectively was taken care of by Webb & White of Los Angeles when they wanted to mix enough cement stabilized base material to cover an entire 18-ft. roadway to a depth of 6 in. in only one pass over each section with their Barber-Greene Model 848 travel plant. The aggregate material consisting of sand and clay had been bladed into the 9-ft. wide trapezoidal windrow, next spread over with cement in the amount of 5% by volume. The contractor then rigged up the bucket loader which tows and feeds the plant with wing extensions for its normal 8-ft. pickup. And in operation its forward speed was reduced a little to compensate for the additional bulk.

In the mixer, water—12% by volume—was added to the mix. After the mixer discharged the stabilized material onto the roadway, at the rate of 265 tons per hr., it was spread by blades and compacted. Tests of the completed mat show that its tensile strength and the degree of compaction exceeded specifications.

THE Barber-Greene Model 848 travel plant is passing over the 9-ft. windrow and is mixing and discharging the stabilized base material over the roadway for spreading and compacting.



By Ned L. Ashton
Consulting Engineer
Iowa City, Iowa

THE popularity of the rigid frame type of building for such structures as warehouses, industrial plants, churches, bowling alleys, swimming pools, gymnasiums, auditoriums, garages, super-markets, etc., demonstrates its attractiveness and efficiency.

By eliminating splice plates and rivets, and utilizing the benefits of rigid framing, cost savings averaging 20% are realized on many types of building construction. Fewer man-hours and simpler equipment are required for erection.

At the present time most rigid frame buildings, made possible by arc welding, are built as two hinged frames with auxiliary purlins and girts running lengthwise of the building to support roof decking and sidewall material running crosswise. The purlins, usually consisting of small channels or angle and zee bar sections or light open web welded joint sections, are placed on top of the frames and the strength of the decking is not utilized for any other purpose.

The building frame in Fig. 1 is made differently. It consists of a typical 60' x 150' building 14 feet high at the eaves and 24' at the center. The metal decking rests directly on top of the rigid frames and spans lengthwise of the building without the aid of any other auxiliary purlins.

When the roof decking is combined with the bracing purlins at the eaves and with the ridge strut it constitutes a strong lateral girder which prevents the intermediate rigid frames from moving sideways at the eaves.

Longitudinal rigidity of the roof, which is accomplished by running the decking lengthwise, constitutes an improvement compared to the conventional type of two hinged frame buildings with auxiliary purlins.

The bracing action of the roof is so helpful that the rigid frames can all be fixed at the bases with ordinary sized footings and the frames can be made of ordinary smaller sized wide flanged "I" beams throughout the full length of the frame without any special haunched or tapered sections at the knee.

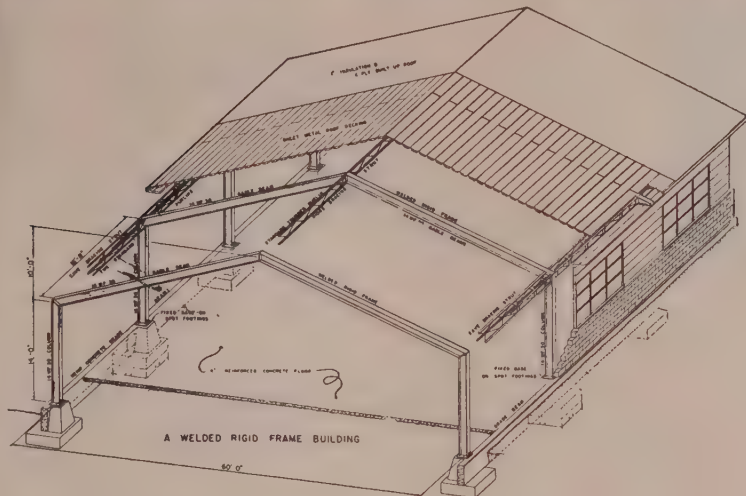


Fig. 1. Welded Frame Building *uses longitudinal rigidity of roof by running welded roof decking lengthwise.*

SIMPLE CONSTRUCTION USES PLAIN STEEL SHAPES

Eave Bracing Strut consists of two standard welded open web roof joists of the same depth as the depth of the 14" W.F. 30 lb. rigid frame beam set in positions so that one trussed purlin is normal to the roof and the other normal to the wall and with the inside edges of their bottom flanges joined together by welding to form an angle strut.

These standard purlins are butt welded to the edges of the rigid frames to constitute the main portions of the strut while the outside corner is made of another piece of bent plate.

This plate is bent to conform to the shape of the outside corner of the rigid frame so that it can also be butt welded in between the frames to constitute the ou

It is then joined to the other trussed purlin sides by means of the intermediate 3" x 1/4" tie plates located in the planes of the roof and wall surfaces. Thus a strong and sturdy box strut is made of standard and easily obtainable elements so that it will brace the knee against all of the various and sundry forces that can combine to cause buckling.

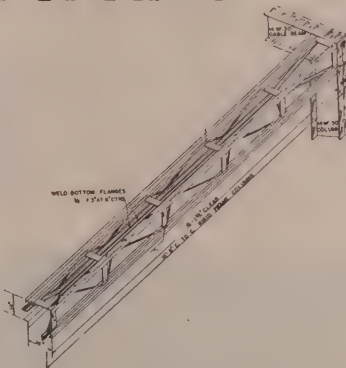


Fig. 2. Eave bracing strut.

Studies in Structural Arc Welding free on request.

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THE LINCOLN ELECTRIC COMPANY
CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

TIPS ON WIRE ROPE

... Continued from page 82

by exposure to moisture, acids, or other destructive agents. Other factors which damage wire rope include crushing, caused by running into or over a hard, sharp object; birdcaging, which is the springing loose of strands from about the core, caused by sudden release from an over-stressed condition; and doglegging, forming a permanent bend or elbow in the rope. Doglegging is caused by pulling the rope around some sharp object or by bending the rope over any small radius object.

Corrosion

When your wire rope becomes corroded, its wires have neither their original strength, nor ability to resist bending fatigue, nor ability to withstand abrasion. And this deterioration is aided by the presence of grit, dirt, dust, filings, and fine particles of corroded wire which work into the rope and help the abrasion along. The best preventive against all this is proper and frequent lubrication—whether the wire rope is working or not.

Lubrication

If your wire rope is to give its best service, it must be lubricated so that it is protected from corrosion and excessive wear, and so that wires move more freely when load is applied and when the rope passes around sheaves and drum. Wire rope

engineers consider the lubricant as a necessary part of the rope, and lubricant is applied at the wire rope mill in the majority of cases. For some uses this factory lubrication is sufficient, but for others additional lubricant must be added in the field.

Different ropes and working conditions require different lubricants and frequency of lubrication for the best results. The main function of the lubricant is to penetrate to the inside of the rope so as to get a film of oil between the strands and core which will help keep the core pliable. The lubricant can be applied either hot or cold, depending upon its penetrating qualities. Wire ropes in constant daily service are less likely to corrode than ropes kept in storage, which dry out quickly. The main thing to remember, however, is that the rope parts must not be permitted to lose their protective supply of lubricant.

Preparing for lubrication

Preparation of wire rope for lubrication is very important. It should be cleaned thoroughly with kerosene and a wire brush and then left to dry. Passing the rope through high-pressure jetted steam has proved a very effective means of cleaning rope of large diameter.

The lubricant, which should be selected according to the special operating conditions, temperature, and the like, may be painted on the wire rope with a paint brush, put on by hand using leather gloves, dripped on out of an oil can, or applied by run-

ning the rope through a bath of lubricant in a wooden trough by means of a sheave mounted on a shaft. After the lubrication is finished, the excess lubricant should be wiped off. Frequent lubrication with light-bodied lubricant is better than infrequent treatment with heavier lubricants.

Wearing out

Constant bending and unbending will finally wear out any rope, but prolonged rope life may be obtained by cutting short lengths of rope from the drum end to vary the points on the rope which are most subject to wear and fatigue. The same result may be had by changing the rope end for end on those installations where these destructive forces are more severe on one half of the rope than on the other half. In these cases, reversing the ends increases the rope service.

When concentrated wear develops in one location—the rest of the line being in serviceable condition—it may be worthwhile to splice in a section of new rope. However, the results obtained are due largely to the expertness of the person doing the splicing. A poorly made splice may not develop as much as 50% of the strength of the original rope, so the services of an experienced rope splicer are recommended for these jobs.

Preformed as well as standard ropes should be properly seized on each side of the spot before they are cut to prevent unlaying or loss of lay or pitch of the strands.

If there is an imprint of the rope in the sheave or drum groove, there is a filing action on the rope at every start and stop. This materially shortens rope life. Grooves having the slightest impressions should be machined and polished.

Stretching

When a good wire rope is first put under tension, there is bound to be a short period of rapid stretching while the various wires and strands are settling into position. This is perfectly normal. During the long period of effective rope life, a slight gradual stretching occurs. Then a point is reached when the stretch again becomes rapid. This is due to the breakdown of the core and the normal deterioration of the wires. Its beginning marks the danger point and is the signal for discarding the rope. The actual factor controlling the time for discarding the rope, however, should be the amount of danger to life and property and past experience with the same equipment. The greater the danger from a broken rope, the sooner that rope should be replaced.

Wire rope is a precisely designed assembly of working parts. Knowing your job, and the capabilities and maintenance needs of your rope, you can improve wire rope service.

First-rate timber bridge up in Northwest

HERE is a 575-ft. deck truss cantilever-type timber bridge which was recently erected in the Northwest by Blair Co., Spokane, Wash. Designed for 100-ton loading and 75-yr. service, it is composed of three 153-ft. spans, plus 46 ft. of approaches and a 24-ft. overpass over the Great Northern Railroad at the south approach. The trusses, floor beams and overpass stringers of glued laminated timbers were built by Timber Structures, Inc. Formed of kiln-dried material bonded with waterproof glues, the timbers are dimensionally stable and free from seasoning action. This will minimize maintenance of the bridge. All the timber parts were treated with creosote and oil by J. Neils Lumber Co., Libby, Mont. The concrete piers are those of a former railroad bridge.



Why "breathing space" between each wire?

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- Heavy, tenacious lubricants fill the spaces between wires. This *Internal Lubrication* guards against corrosion and friction, and also increases flexibility.
- Macwhyte's PREforming process forms the wires and strands into a spiral so they lie naturally in place with a minimum of internal stress.
- From a thousand and one wire ropes, Macwhyte engineers are ready to recommend the right rope for your particular needs. For best, lowest cost wire rope service, write today for recommendations of the best constructions of rope to use on all your equipment.



This Macwhyte Rope is 6 x 41 Filler Wire PREformed Lang Lay Monarch Whyte Strand with IWRC, just one of the thousand and one wire ropes made by Macwhyte.

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**THE RIGHT ROPE
FOR YOUR EQUIPMENT**

**Ask for G-15
Wire Rope Handbook**



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1044L

REPORTS

FROM THE COURTS

By

HOWARD S. BURNSIDE

Attorney at Law
Registered
Professional Engineer



Mechanics lien held invalid

"It has become . . . law in this state (Oregon) that a lien cannot be upheld if the lien notice mingles in unsegregational form lienable and nonlienable items . . . the record discloses that in the lump sum charges for labor and material as shown in the lien notice there are included, without any segregation, charges for the construction of certain equipment inside the building. Defendants maintain that these articles of equipment were trade fixtures only . . . and, therefore, constituted non-lienable items. If those items are nonlienable, as contended by defendants, the lien is invalid."¹

The court found that the pieces of equipment in question were trade fixtures. They should not have been included in the lien notice; therefore, the lien was invalid. Mechanics lien laws are construed strictly and close adherence to form and procedure is essential.

¹ *Barber v. Henry* 252 P. 2d 802.

Purchase by road commissioner void

"One who deals with a public officer stands charged presumptively with a full knowledge of that officer's powers and is bound at his peril to ascertain the extent of his power to bind the government of which he is an officer, and any act of an officer to be valid must find express authority in the law or be necessarily incidental to a power expressly granted.

"The office of road commissioner is created by the Streets and Highways Code. Sections 2006 to 2009 of that code provide for the appointment by the board of supervisors of a single road commissioner for all road districts in each county of the state, fix his qualifications, prescribe from what monies his salary shall be paid, and limit his contractual powers.

"His contractual power is limited by section 2009 of this code to hiring employees and to the purchase, lease or hire of road equipment. This power to so contract is, however, a conditional one, and by virtue of the statute can only be exercised subject to the approval of the board as to the price

or rental. By no provision of the law is any authority conferred upon him to purchase road materials of any kind.

"While the courts will go to all reasonable lengths in interpreting the statutes conferring powers upon the officers of the state in order that the laws may be given effect and the ends of justice subserved, they cannot by construction confer upon any officer an authority which the Legislature has seen fit to withhold.

"If, as appellant contends, Barieau ordered the crushed rock for the county of Placer, he had no authority in the law to do so and his act was void. The void acts of a public officer cannot be ratified.

"The judgment is affirmed."¹

¹ *Bear River Gravel Co. v. Co. of Placer* 118 ACA 816.

Contractor's secret agreement unenforceable

Plaintiff sued to prevent a sale of his house under a deed of trust which he had given to secure his promissory note to the contractor who built it. He had obtained a "G. I. loan" from a bank for \$8,975.00 based on an appraisal of \$11,475.00. Before making the loan, the bank required a construction contract fixing a definite cost with a responsible builder. The plaintiff and defendant-contractor provided this by executing a contract for a price of \$8,975.00. At the same time, but between themselves, they entered into another agreement to do the job on the basis of cost plus a percentage fee and specifically provided that this latter agreement was part of the first contract made ostensibly for the sole purpose of satisfying the bank's requirement.

When the house was completed the total cost as computed by the cost plus contract was over \$13,000.00 and the plaintiff gave the defendant-contractor a promissory note and deed of trust for \$4,300.00. It is this note which the contractor seeks to collect. One of the conditions of the loan written into the federal act is that the price to be paid by the veteran should not exceed a proper appraisal. Here the total price exceeded the appraisal by \$1,804.00.

The court held that the second agreement violated the policy of the

law and would not permit the contractor to enforce the agreement. This is in accord with the general principle of law that the courts will not undertake to enforce illegal contracts but will leave the parties where it finds them.

However, the appellate court found that there may have been legitimate items of extra cost and ordered the trial court to reduce and cancel the promissory note for \$4,300.00 except for properly allowable extras; but in any event the price is not to exceed the Veterans' Administration maximum cost of \$11,475.00.

This case and other cases which it follows is clear warning that contractors will not be allowed to enforce secret agreements which violate the rules and intent of G. I. loan provisions.

Pitts v. Highland Constr. Co., et al 252 P. 2d 14.

Contractor responsible for delayed completion

The contract provided for completion of construction of a grain elevator by November 30. The defendant desired to store the November harvest. The job was finished December 29 and defendant refused to make the final payment, asserting that the delay caused loss of revenues and other damage. The contractor in turn said the fault for the delay rested with the defendant and the financing agencies because they delayed approval of loans to finance the construction. The matter of financing was not dealt with in the construction contract.

The contractor sued for his final payment and the jury, after hearing all the evidence, held that the defendant was damaged by the delayed completion. The contractor appealed but the judgment was affirmed. The court said that official approval of plans by the financing agency was never part of the contract and in fact was not an issue at the trial. It further appeared that even when the contractor did commence work he was aware that the approval had not been given at that time.

The result of this case points up the importance of considering all factors when a contract with a guaranteed completion time is made.

J. S. Const. Co., Inc. v. Casterline Grain & Seed Co. 252 P 2d 893.

WESTERN CONSTRUCTION NEWS

NOVEMBER 1953

MacLeod wins AGC nomination

JOHN MACLEOD, president of Macco Corp., Paramount, Calif., has been nominated for president of the Associated General Contractors in 1954. MacLeod's nomination was made by AGC governing and advisory boards at the Edgewater Beach Hotel, Chicago, September 14-16. Voting will be by letter ballot in December and installation of the new officers will be made at the end of the organization's annual convention in

Los Angeles in March 1954. MacLeod, who is currently vice president, has been very active in AGC. He is currently a member of the executive and finance committees and the Construction Industry Manufacturers Association-AGC joint cooperative committee. George C. Koss, president of Koss Construction Co., Des Moines, Iowa, has been nominated for the vice presidency. He is a member of the AGC executive committee.



John MacLeod, second from right, is congratulated by C. P. Street, center, president of AGC, upon being nominated for 1954 presidential office. Others in the group are, left, James D. Marshall, executive director of AGC; George C. Koss, nominee for vice president in 1954, and, far right, H. E. Foreman, managing director of AGC.

Prestressed to be tried for Alaska bridges

THE FIRST precast, prestressed concrete bridge deck in Alaska will cross the Eyak River on the Copper Highway near Cordova. In August M. P. Munter Co. of Seattle was awarded the construction contract by the Bureau of Public Roads in Juneau on a bid of \$145,957. This totaled only \$400 more than an alternate low bid for conventional construction with a concrete deck on steel beams and stringers. Munter submitted the only bid for precast, prestressed construction.

According to Division Engineer Hugh A. Stoddart, if this method of bridge construction proves successful it may be used extensively in Alaska, particularly in areas which can be easily reached by barge transportation.

Salt Lake voters OK \$8,900,000 sewer bonds

VOTERS in Salt Lake City Suburban Sanitary District recently voted overwhelmingly in favor of an \$8,900,000 bond issue to finance a long-delayed sewer system. Two bond issues were up for vote: one called for \$2,400,000

worth of general obligation bonds and the other for \$6,400,000 in revenue bonds. County officials were highly gratified at the results of this unprecedented 5 to 1 acceptance of the project at issue. However, since the general obligation bonds will be paid for by a levy on property within the district, the Utah Supreme Court must rule on validity of the ordinance, various phases of the district organization, and validity of laws providing for the levying of taxes to finance the \$2,400,000 bond issue. If the verdict is favorable, consulting bond attorneys in Chicago will approve sale of the bonds at public bidding. And then after sale of the bonds construction can begin. It is estimated that construction of the sewage disposal plant and installation of the collection system will take about one year.

Falcon Dam dedicated

DEDICATION ceremonies at Falcon Dam on the Rio Grande River were highlighted by President Eisenhower and President Cortines of Mexico. Date set for the meeting of the two presidents was October 19. Construction of this project, which is about 75 mi. downstream from Laredo, Texas, has been called "an outstanding example of practical cooperation by two neighboring countries in the utilization of a common resource." Its construction was supervised by the International Boundary & Water Commission under terms of the 1944 water treaty between the two nations. (See *Western Construction*, March 1953, pp. 81-83.)

Spokane changes bidding procedure

THE CITY of Spokane, Wash., will no longer award paving contracts if the bids are higher than the engineer's estimate. From now on the city's asphalt paving forces will take on the jobs, which is exactly what used to happen whenever favorable bids were not received. This was done, however, when only one firm was interested in the bidding. Recently, Spokane was awarding contracts on low bids which were up to 6% higher than estimated costs. City officials hope that this new action will encourage more favorable bidding response from contractors.

\$29,000,000 low bid on 615-mi. Alaska pipeline project

ONE of the most widely publicized bid openings in recent months resulted in a \$29,001,281 joint low bid offered by Williams Bros. Construction Co., Tulsa, Okla., combined with McLaughlin, Inc., of Great Falls, Mont., and Marwell Construction Co., of Vancouver, B. C., for a 615-mi. Alaskan pipeline project. Only three other bidders participated.

On October 14 the Corps of Engineers opened these bids in its Seattle offices for the large-scale Haines-to-Fairbanks petroleum pipeline project which will supply interior Alaska with fuel for its military works. Starting at Haines, the estimated \$40,000,000 line will travel via the Haines cut-off and Alaska highways, traversing 284 mi. in Canada (approved by the Canadian government), and making a 9-mi. crossing through Kluane Lake, which is north of Whitehorse in Yukon Territory, Canada. The alternate offered on the bidding involving a detour around the lake to add 6 mi. to the pipeline was the basis of the Williams-McLaughlin-Marwell low bid.

The entire project covers furnishing and laying this 8½-in. (outside

diameter) welded steel pipeline, construction of a POL terminal wharf at Haines, construction of five pumping stations with complete utilities and four complete with supporting facilities, terminal facilities near Fairbanks, two intermediate take-off facilities and two tank farms. Three of the pumping stations will be in Canada. It has been estimated that 42,000 tons of pipeline will be needed to complete the job.

This line and its 50-ft. right-of-way will cross mountains, rivers, canyons, and miles of open land. Much of its length will parallel the Alaska Highway, passing near the peaks of the St. Elias and Wrangell mountain ranges. At some major stream crossings the pipeline will use permanent highway bridges. Much of the pipeline must be laid in permafrost. About 435 mi. will be surface laid and the remainder will be buried.

In order to meet the scheduled completion date of September 1955, work will begin immediately after the project is awarded. During the winter the contractor can clear the right-of-way and string pipe along the route. Port facilities at Haines will be used

for shipping materials at the southeastern section of the project and those of Seward and Valdez will be utilized as work moves northward.

There have been only a few precedents in pipeline construction in the sub-Arctic. Early in World War II the Canol lines (3 to 6-in. lines) were built to tap Arctic oil fields in Canada. A section of one of these lines will be used to supplement the new line into Fairbanks.

New Los Angeles bridge goes up in flames

A 300-ft. section of the new \$1,000,000 ridge crossing the Los Angeles River at Rosecrans Ave. collapsed into the dried riverbed when ravaged by fire in the middle of September. County Road Commissioner Sam R. Kennedy said that steps probably will be made to replace the burned portion with a dirt fill, a project under consideration when the bridge was first planned. Both east and west approaches had been constructed partly of wood and only the middle concrete and steel section was designed as a permanent structure because, Kennedy explains, the Corps of Engineers was considering narrowing the flood control channel to the dimension spanned by the permanent portion of the bridge. Meanwhile, motorists were forced to detour while a temporary road was constructed. Losses were estimated at \$185,000, including \$2,000 damages to the permanent portion of the bridge.

It's cheaper to go over than under

RESULTS of a report on comparative costs requested by San Fernando Valley, Calif., citizens show that it would cost from three to four times as much to build the San Fernando Valley 12½-mi. transmission line as an underground line than it would to build it overhead as now planned. For the 5.9-mi. section through the Valley comparative costs show: overhead, \$1,818,000, and underground, \$5,085,000. Comparative costs for the entire 12½ mi. to Kenter Canyon would be: overhead, \$3,043,000, and underground, \$12,028,000.

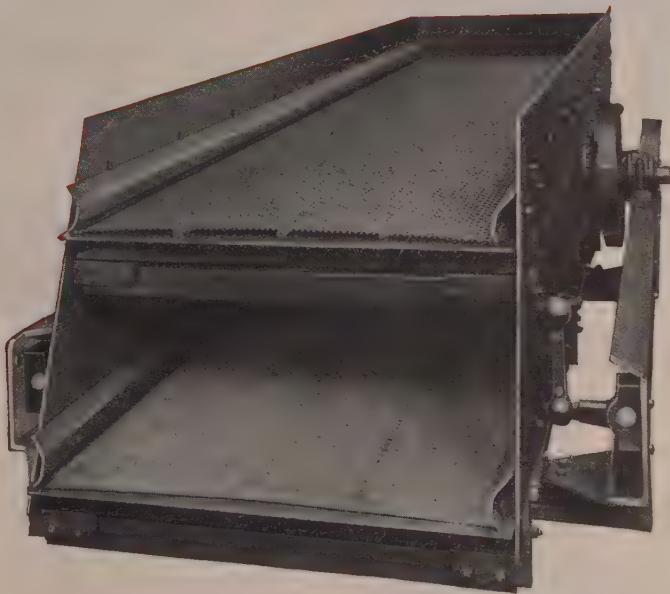
But, as stated in this report by Samuel B. Morris, general manager and chief engineer of the Los Angeles Department of Water and Power, to Mayor Poulson, those citizens who fear that reduced real estate evaluation would result from the effects of overhead transmission lines in the neighborhood needn't be unduly concerned. Recent studies show that assessed values are not affected by the presence of a transmission line and that property adjacent to the line sells for as high a price as property at a distance.

Steel columns have four shafts on one base plate

UNUSUAL design feature of the new five-story \$6,700,000 Electronics-Electrical Building at the Mare Island Naval Shipyard, Vallejo, Calif., is the use of a number of structural steel columns made up of four shafts on one base plate. Each of the four-shaft columns weighs 24 tons. There are also a considerable number of two-shaft columns on one base plate. Section of the building shown below is 365 x 418 ft., and 121 ft. high. It will be a windowless structure with a high bay crane runway wing on one side. Designing structural engineer is F. W. Kellberg of San Francisco. General contractors, in a joint venture, are Grove, Shepard, Wilson & Krueger of California, Inc., and Fred J. Early, Jr., Co., Inc., San Francisco. Steel is being fabricated and erected by Bethlehem Pacific Coast Steel Corp.



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WASHO Holds 32nd annual conference

WELL PLANNED, well attended and unusually successful, the annual conference of the Western Association of State Highway Officials was held October 7-10 in Santa Fe, New Mexico, with general sessions and panel discussions covering a full range of highway subjects and problems. As official host of the conference the State Highway Department of New Mexico under the direction of C. O. Erwin, state highway engineer, provided the official delegates and others associated with highway engineering in the West with a solid program.

At the close of the conference officers for the following year were elected. They are: E. V. Miller, state highway engineer of Idaho, president; C. O. Erwin, state highway engineer of New Mexico, vice president; and William Willey of the Arizona highway department, re-elected secretary. In addition the following were elected to the executive committee: D. C. Greer, state highway engineer of Texas; W. A. Bugge, Washington director of highways; and W. C. Williams, assistant state highway engineer of Oregon. Outgoing president of WASHO who presided over the conference sessions was Mark U. Watrous, state highway engineer of Colorado.

Principal feature of the first session was a comprehensive report on the WASHO Road Test by E. V. Miller, state highway engineer of Idaho, covering the design and testing program. On the second day the conference was divided into discussion groups covering the following subjects: administration, right of way, materials, design, construction, maintenance, bridges, and planning. A general session on the same day heard extensive comments relating to the subject of user taxation for highways.

The "Dr. L. I. Hewes Award" sponsored by *Western Construction* was presented to Percy V. Pennybacker of the Texas Highway Department based on his outstanding contributions in the application of welding techniques to maintenance and building of highway bridges.

Detailed report on subjects of particular interest to those concerned with highway construction will be presented in subsequent issues.

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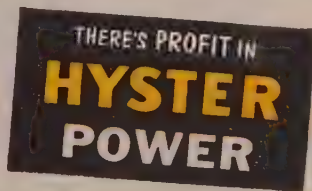
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San Diego second barrel over half completed

SPOKESMAN Jean Walton of the Bureau of Reclamation has reported that work on the second barrel of the San Diego Aqueduct has now passed the halfway mark. With 56% of the 70-mi. concrete waterway completed, by next February the northern 30 mi. to the San Luis Rey River may be ready, enabling the Fallbrook area to hook onto the new pipe and release all of the first barrel's capacity for flow south of the river. Walton said that 130,682 ft. out of a total of 163,079 ft. had been laid in the northern area by October 5. South of the San Luis Rey River S. A. Healy Co., which had a late start, had laid 37,485 ft. of a contracted 151,500 ft. Work on this second barrel section of the San Diego Aqueduct began last autumn and is scheduled for completion by late next year. When completed, the pipeline project will double the Colorado River water supply for San Diego County.

Congress approves funds for Alaska

APPROVAL of appropriation of \$14,600,000 for Alaskan road construction and \$12,000,000 for the Alaska Public Works recently was

reached by a Senate-House conference committee. It also approved \$7,750,000 for continuation of the Eklutna Project, and \$1,500,000 for rehabilitation of piers at Seward. However, a Senate-proposed \$5,535,000 appropriation for rehabilitation of the Seward-Portage line of the Alaska Railroad was rejected.

Oregon and Washington agree on Columbia span

THE STATES of Oregon and Washington have reached an agreement on construction of a \$10,000,000 parallel span crossing the Columbia River between Portland and Vancouver. Expected to be ready for service in about 2½ years, this new bridge will carry three-lane traffic in one direction while the other, existing, span will handle traffic in the opposite direction. At that time tolls will be put on each bridge.

Welding manual available

A NEW "Welding Manual," superseding the tentative edition of "Arc-Welding Manual" published in 1950 by the Bureau of Reclamation, is now available. This 208-page volume concerns welding particularly as it is applied to steel structures and pressure vessels, welding inspection and tests,

and gives information on joining non-ferrous metals, surfacing and metalizing. Two appendices define terminology and discuss the metallurgy of welding. A glossary of welding terms is included, together with a complete index. The pocket-size edition, in flexible binding, is available for \$1.75. Orders may be sent to the Superintendent of Documents, Washington, D. C., or to the Bureau's Supply Field Division, Attention: 841, Denver Federal Center, Denver, Colo.

New Mexico highway needs analyzed; no action

A HIGHWAY STUDY made by H. S. Wiley, New Mexico planning engineer, estimated that \$673,000,000 is needed to bring the State's roads up to a suitable standard. An average annual cost over a 20-year period would be \$33,688,000; for five years \$80,000,000 per annum or a total cost of \$400,000,000 excluding the normal inevitable repairs necessary over the longer period. This analysis was presented before the State legislature, which failed to act upon it, according to W. A. Gallup, head of planning for the Wyoming State Highway Department, which is now beginning a study of Wyoming's needs and will use approximately the same methods as those used in New Mexico.

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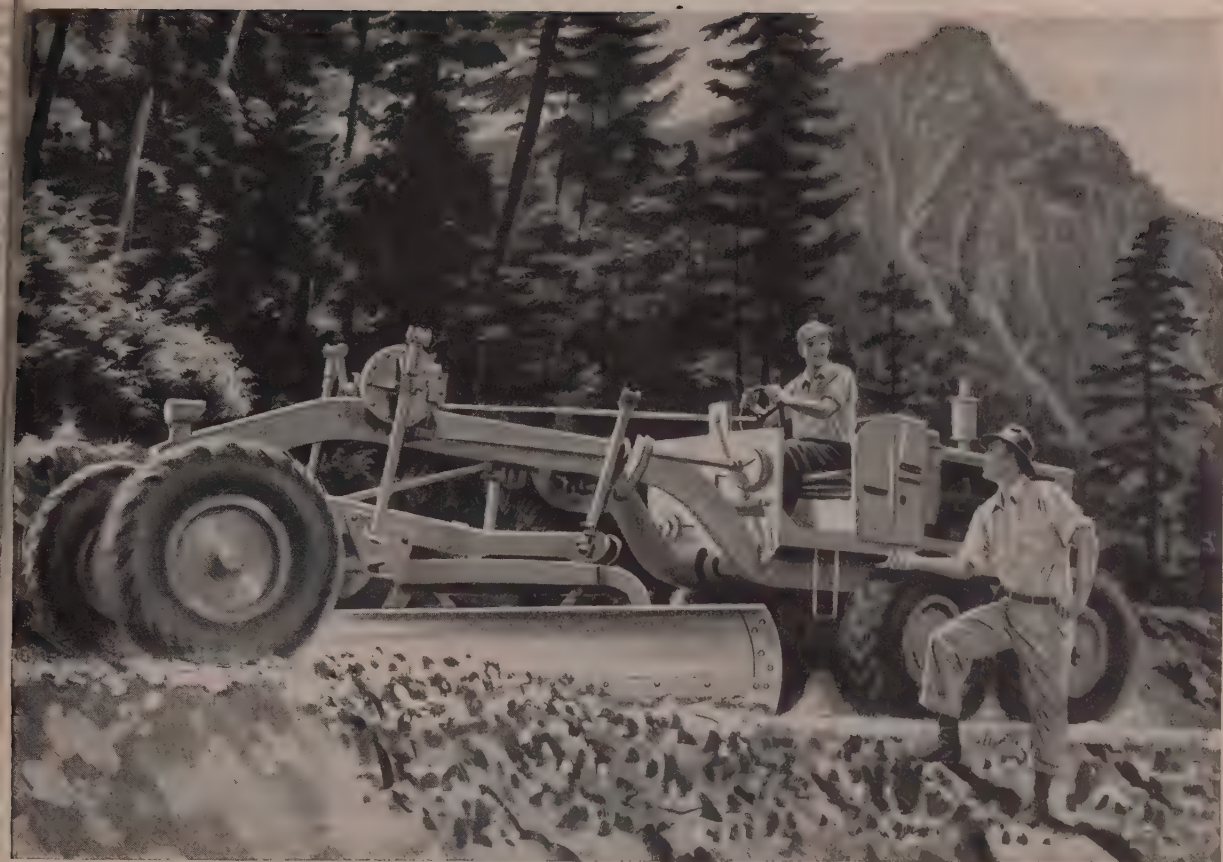
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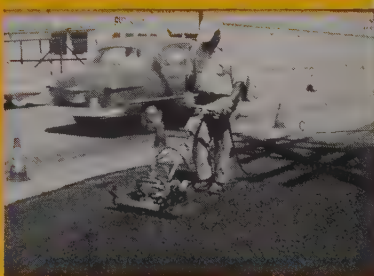


MACADAM CONSTRUCTION

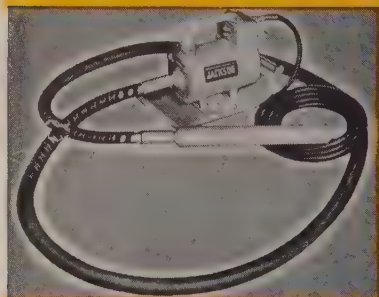
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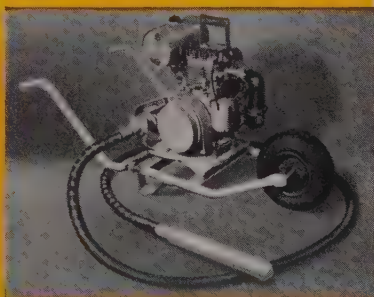
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Southern Calif. Edison power project okayed

A 50-YEAR license has been given to Southern California Edison Co. by the Federal Power Commission for construction of a hydroelectric project on Mono Creek in Fresno County. Estimated at \$8,500,000, chief feature of the project will be Vermillion Valley Dam, which will be about 160 ft. high and 4,350 ft. long. This structure will form a reservoir with a gross capacity of about 125,000 ac. ft. Water will then be discharged downstream to the firm's existing hydroelectric plants, thereby increasing their present capacity to about 122,000,000 kw.-hr. annually. No power and generating facilities are included in the new construction. Construction must start by the first of the year and completion has been scheduled for June 30, 1956.

Meanwhile, Southern California Edison Co. began construction of its seventh steam-electric generating plant. First unit of this new structure, located at El Segundo, will have a 156,000-kw. capacity. Bechtel Corp. has the award. Ultimately there will be two units, total cost of which has been estimated at \$44,000,000.

Fontana Project studies published by TVA

PUBLICATION of Technical Monograph No. 68, "Fontana Project Hydraulic Model Studies," has been announced by Tennessee Valley Authority. This is a comprehensive account of all model investigations conducted for the construction of Fontana Dam on the Little Tennessee River in western North Carolina. The model tests were made in TVA's hydraulic laboratory at Norris, Tenn. This 384-page monograph containing 71 drawings, 53 tables and 165 photographs can be obtained for \$5.00 from the Treasurer, Tennessee Valley Authority, Knoxville, Tenn.

Research of earthquake effects on masonry

A COMPREHENSIVE study aimed at making masonry structures in the Northwest more resistant to earthquakes has passed the preliminary stages. Professor Harry C. Weller of the architectural engineering staff, Washington State College, Pullman, and assistant James Mackey, recently completed compiling an exhaustive bibliography pertaining to the world's earthquakes of the last 50 years. Next steps will be to build and test models suggested at the initial stages. The entire project is sponsored by the Industrial Research Division, Washington State Institute of Technology, for the Washington Concrete Products Association, Seattle.

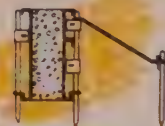
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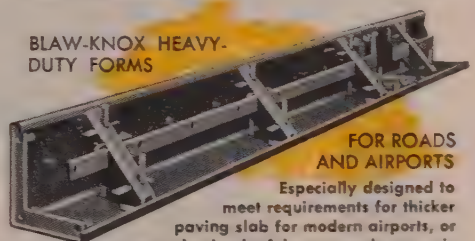


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Work begins on Sacramento valley canals

GROUND BREAKING operations on October 17 started work on the \$60,000,000 Sacramento Valley Canals Unit of the Central Valley Project. Richard K. Durant, construction engineer for the project, predicted that about 125 employees will be on the job when work reaches its peak period. First task was clearing the right-of-way for access roads to Red Bluff Diversion Dam in Tehama County. These canals ultimately will irrigate more than 200,000 acres of land in the Sacramento Valley.

Utah mix specs tightened

BETTER—and cheaper—highways. Any new method for achieving this result is welcome news for state road officials and contractors. The State of Utah is using certain mixing specifications this year which are expected to achieve these results, according to H. J. Corleissen, vice-chairman of the State Road Commission. Specifications for the first time state that "mixing by a machine designated principally for mixing shall be used" and that "power graders for mixing will not be permitted."

Mixing machines insure a uniform mix of pulverized soil and cement but when road materials are mixed mere-

ly through a grader's pushing action the larger stones remain on top, causing unstable conditions in the base. Corleissen said that use of the mixing machines will permit mixing the cement with already available materials on the highways, that reclaiming of present materials and the use of soil cement will take the place of a completely new base and make Utah's highways, "almost as strong as concrete."

Wazzat bug?

PROFESSOR of entomology at the University of Connecticut, Jerauld A. Manter, was recently besieged by an irate housewife who claimed that she was being disturbed by intermittent screeching from a near-by wood. Manter entered the wood and traced the source of dissonance to the site of a clearing job. There the insect hunter found an all-time prize catch, a busy bulldozer operating without the assistance of an oilcan.

Continental Divide tunnel given OK by expert

TUNNEL EXPERT Ole Singstad, who designed the Holland Tunnel under the Hudson River, has looked over (under) the mountains and announced that a bore through the

Continental Divide in Colorado is possible. Singstad went to Colorado and spent several days in the field with Mark U. Watrous, State Highway Engineer, then returned later and revisited the sites he had earlier surveyed. These sites include the Devil's Thumb area west of Nederland which would connect with the Denver-Boulder turnpike; the Jones Pass area leading into Dillon through Williams Fork, and the so-called Straight Creek site north of Loveland Pass and the old Loveland Pass pioneer bore. Singstad is representing Howard, Needles, Tammen & Bergendorff, Kansas City engineering firm which designed the Denver-Boulder Turnpike.

Albuquerque pump station worker ambushed; sues city

VICTIM of an ambush at Atrisco Pump Station No. 2 in Albuquerque, N. Mex., on the night of February 5 has filed an \$87,000 suit against the city. The victim, W. H. Richardson, was employed at the time by C & C Construction Co. to watch construction supplies, and he claims that he probably would not have been attacked had not the city allowed its lighting system to fall into disrepair. The felons opened fire in the darkness, shot him in the leg, and also impaired his eyesight.



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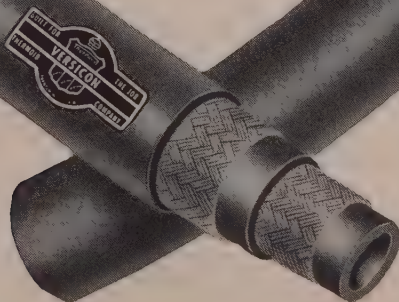
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By CLIFFORD S. CERNICK, Anchorage

PUBLIC HOUSING'S SWAN SONG in Alaska is slated for Oct. 29 when the Alaska office of the Housing and Home Finance agency pulls out of the territory. A. L. White, program representative for the agency in Anchorage, says the move is being taken "because the basic needs for housing in the territory are now nearly satisfied." White says federal officials have apparently decided that further housing construction in the territory can be financed by private enterprise.

IMPOSING CONSTRUCTION RECORD—At conclusion of public housing program in Alaska figures were released showing that since 1951 more than 2,850 housing units have been constructed in the territory and insured by Federal Housing Administration. At present an additional 700 units are either under construction or slated for construction in near future. FHA insured housing has run gamut of structure types from city's three skyscraper apartment houses to a number of sprawling two-story projects in Anchorage. FHA has insured upwards of \$150,000,000 in construction since office was established here in 1951.

TUNDRA TRANSFORMATION—Typical of the speed with which Alaskan housing projects sprouted is the record set by the firm of Johnson-Crooks. The company completed 400 homes in 24 weeks near Anchorage. Ground broken for the project last April; first slabs poured May 8—last slab June 30. The 400 foundations were poured in 36 working days. How was it done? Peter W. Schenck, project manager, said it was due to careful planning, bulk purchasing, well-worked-out construction methods, high quality of the labor force and skillful supervision.

COST-PLUS NOW EXTINCT—Alaska District Corps of Engineers took sharp exception to widely publicized statements on Alaska construction made by Robert Campbell of Toronto, Canada, president of Camray Mines, Ltd. Campbell said high labor costs and government cost-plus construction have contributed to "artificial price structure" that is hampering development of mining in territory. Not so, said spokesman for the District Engineer. "Defense construction in Alaska is conducted on a lump-sum, competitive basis," Engineers state. "The cost-plus system has not been used by the Corps of Engi-

neers since 1949." Engineers justify former use of cost-plus on basis that the post-war condition of the material, labor market was such that the cost-plus method was the only practical way in which defense construction in Alaska could be accomplished.

BEACH CAMP BEST—Unique problem faced one firm in setting up construction camp near Icy Bay on Alaskan coast. More than 125 Kerr-McGee construction workers who were flown to the area to begin oil drilling in the Katall-Yakataga field abruptly revised their plan for setting up a work camp in the hills. Howard Park, aviation construction engineer in charge of a territorial airport project at Icy Bay, said the men counted 58 huge brown bears in one day, then decided to pitch camp between the beach and the cleared airstrip.

HEADED FOR CHINA—ONE BUILDING: Uncle Sam's going to have to shell out some hard cash to save the Nome federal building which is in danger of cracking up and sinking down. The building, constructed in what was believed to be permanently frozen earth, is settling rapidly and alarmingly, and has been for the past year. Engineers drove temperature points into the foundation and found that the once-frozen ground had thawed, placing the weight of the entire structure on beams designed to carry the weight of only the upper stories. Emergency repairs are scheduled.

CRYSTAL GAZERS—Contractors, union bosses, merchants, all would give eye teeth for inkling of what '54 construction will approximate. Some straws in the wind—gathered from top officials here—indicate slight upswing in volume. It's believed here that Russia's possession of the hydrogen bomb may lead Congress to boost Alaska construction funds. Brightest outlook for Alaska's economic picture—on long range basis appears to be in exploration and development of natural resources and establishment of new businesses and industries. Most groups in Alaska agree the territory is being held back by restrictive legislation, inadequate land laws and a multitude of similar conditions.

MINERAL TREASURE-HOUSE—Alaska's seemingly boundless wealth of minerals soon may be tapped by a growing list of U. S. firms . . . Kennecott Copper through a subsidiary concern, Bear Creek Mining,

is commencing exploration of copper-molybdenite-silver-gold deposits of Nabesna River . . . Texas Gulf Sulphur of New York is interested in Prince William Sound pyrite deposits . . . Anchorage Chamber of Commerce reports a consulting geologist for U. S. Steel will be back in Alaska in 1954 and is interested in iron deposits in Western Alaska . . . Kenai Chrome Co.'s operations on Kenai Peninsula are now in production, and are scheduled to add 13,000 long tons of chromite to government stockpiles, within next year and half.

HOPES FOR HYDRO—Power survey of Alaska's hydroelectric potential indicates 11,650,000 kw. could be generated in territory on basis of preliminary studies of existing sites. Wesley H. Butler, civil engineer for Alaska District Corps of Engineers, says that Alaska, with only one-hundredth of the earth's land area and one ten-thousandth of world population, is one of nature's storehouses of hydroelectric energy.

WOULD DWARF GRAND COULEE—Butler reports the government has given study to possibility of constructing a giant dam at upper Yukon near Rampart Rapids. Dam would be capable of developing 5,000,000 kw., or as much as the combined capacity of the three greatest existing power dams in the world. A dam 350 ft. high at Rampart would store 40,000,000 acre-feet of water in a lake 250 mi. long. This, says Butler, would change the climate of interior Alaska by raising temperature and increasing precipitation. Butler considers Rampart's dam "a challenge to the engineering profession" and a project that would revolutionize Alaska's economy by attracting world's largest users of hydroelectric power.

DAM CONSTRUCTED BY NATURE?—Scientists at Fourth Alaska Science Conference were told by Butler that Mother Nature might furnish a power dam at a unique Alaska location. This is at Lake George on the Knik River near Anchorage where the seasonal runoff each year is stored behind an ice dam formed by advancing Knik glacier. The lake is self-dumping annually, the outflow occurring when a channel is eroded through the ice barrier by water. Butler theorized that control of the lake level might prevent such erosion, while a tunnel could be cut through the canyon wall to deliver water to a powerhouse below the ice dam, to produce 120,000 kw. of relatively low-cost power. He urged caution and thorough study of the project, however, on the basis that "the public might be inclined to look with disfavor on the engineering profession if the ice dam should suddenly disappear."

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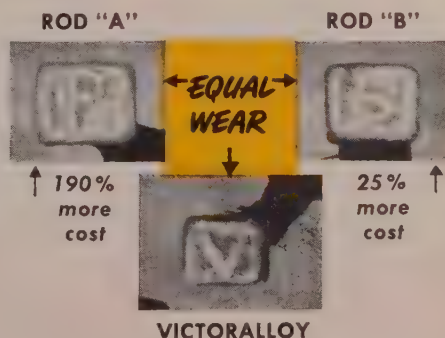
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SAFETY

Job accidents take their toll

THESE were the accidents that resulted in death or serious injury on the West's construction jobs during the last reported month:

Jose Aguilar was hospitalized with back injuries after he was struck by a bucket suspended from a cable. Aguilar, operator of a cement tamping machine, is a construction worker at Folsom Dam.

Felix Randle, workman on a storm drain project at Woodland, Calif., was saved from suffocation on September 10 by the quick action of fellow workers who dug him from under a cave-in in a 14-ft. trench. Randle was taken to the hospital to recuperate from shock and minor bruises. The cave-in was reported to be caused by vibrations from heavy trucks driving over the pavement near the trench. As a result, traffic was re-routed from the area during working hours. Robert Woods was also submerged in the trench but only up to his armpits.

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

A veteran steelworker on construction of an electronics building at Mare Island Naval Base, Calif., died September 12 from injuries suffered in a 40-ft. fall from a girder. The victim, Francis Adams, 57, was employed by Bethlehem Pacific Coast Steel Co. Cause of the fall was undetermined.

John T. McClain, 45, was killed on September 9 as the result of a 20-ft. fall from an incomplete portable steel scaffolding which fell on top of him. McClain was employed on construction of a Benicia, Calif., arsenal warehouse.

P. H. Underdown, 44, was instantly killed on August 24 when a grader which he was operating plunged down an embankment near Orleans, Calif. Hacksaws were required to remove the body.

Carl Wood, 63, an employee of Cold Springs Lumber Co., was fatally injured when his tractor overturned near Tieton, Wash.

Charles William Overton, 41, was killed September 2 when a steel cable on a heavy power dragline snapped

and struck him on the head. Overton had been working only one day for Brown Construction Co. on a highway project near Florence, Ariz.

Horatio Webb Kelly, 26, was crushed to death between a swinging crane and the cab of the equipment. Kelly, a crane oiler, was working on the Melwood St. reservoir at Glendale, Calif. It was his first day on the job.

Report gives statistics on construction fatalities

A recently concluded study of construction fatalities investigated in California during 1949-1952, brings out certain concrete, revealing facts. The report, which was made by the Department of Industrial Relations, Division of Industrial Safety, is based on actual case histories covering such items as occupation, activities, accident types, unsafe conditions, and unsafe acts. For example, the fatality study showed that among the various types of construction within the industry, the greatest number of deaths (57.8%) occurred in the general construction field with painting second and steel fabrication and erection running third. In the worker's classification or occupational field, percentage-wise, the laborer headed the top of the list with a 28% fatality rating. Carpenters ran second with 10.6% and painters third with 9.4%. Regarding the type of activity in which the greatest number of fatalities occurred, the highest percentage (15%) was attributed to persons waiting or standing; second, those persons handling, lifting, carrying, or adjusting and assembling were responsible for 11.8% of fatalities. In the activity classification of repairing, adjusting and assembling, the fatality rate was 9.4%, tying with the activity classification of operating machines where fatalities also reached a 9.4 figure. The study reveals that 33.6% of the total fatalities were attributable to the fall of persons from varying heights of elevation to the ground. Second highest accident type resulted from cave-ins, claiming 10.5% of total fatalities, with the accident type of "run-over-by-heavy-equipment" classification taking third place with 9.4%.

The above figures are all the more significant because they pertain to human lives lost. The report does not directly point out the number of lives lost unnecessarily, but it does give the items as leaders to the contributing causes of the accidents, such as lack of, or improper shoring, beams, braces; unguarded or an inadequately guarded agency; low material strength, unsuited, makeshift, wrong kind or size; unsafe planning, layout or traffic; unsafely stored or piled tools, materials and so forth. Answers to the questions, "How can these matters be guarded against? How can I determine the severity of accident

rate on my construction job?" may depend largely upon a consistently active participation in a safety program directed towards the prevention of accidents before they happen rather than corrective measures once the fatality has occurred.

CALENDAR OF MEETINGS

Nov. 30-Dec. 4—American Institute of Steel Construction, annual convention, Boca Raton Hotel and Club, Boca Raton, Florida.

Dec. 1—Colorado Building Chapter, AGC, annual meeting, at Albany Hotel, Denver.

Dec. 4-5 — Northern California Chapter, AGC, annual meeting, at Palace Hotel, San Francisco.

Dec. 7 — Intermountain Branch AGC, annual meeting, at Springville, Utah.

Dec. 12 — Colorado Section, ASCE, annual meeting.

1954

Jan. 5-7—American Road Builders' Association, annual meeting, Chalfonte-Haddon Hall, Atlantic City, New Jersey.

Jan. 8-9—Intermountain Branch, AGC, annual convention, at Hotel Utah, Salt Lake City.

Jan. 8-9 — Montana Contractors' Association, Inc., and Montana Building Chapter, AGC, joint annual meeting, at Northern Hotel, Billings.

Jan. 13-14 — Portland Chapter AGC, annual meeting, at Multnomah Hotel, Portland.

Jan. 14—San Diego Chapter, AGC, annual meeting, at El Cortez Hotel, San Diego.

Jan. 22-23—Colorado Contractors Association, Inc., AGC, annual convention, at Shirley-Savoy Hotel, Denver.

Jan. 29—Central California Chapter, AGC, annual meeting, at Hotel Mark Hopkins, San Francisco.

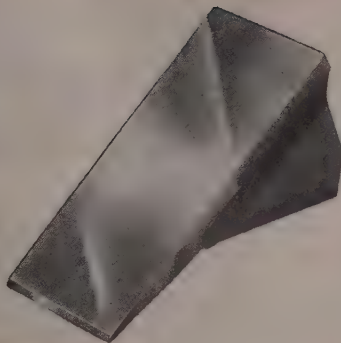
Jan. 31-Feb. 4—Associated Equipment Distributors, national convention, at New York City.

Feb. 25-27 — American Concrete Pipe Association, 46th annual convention and meeting, at Fairmont Hotel, San Francisco.

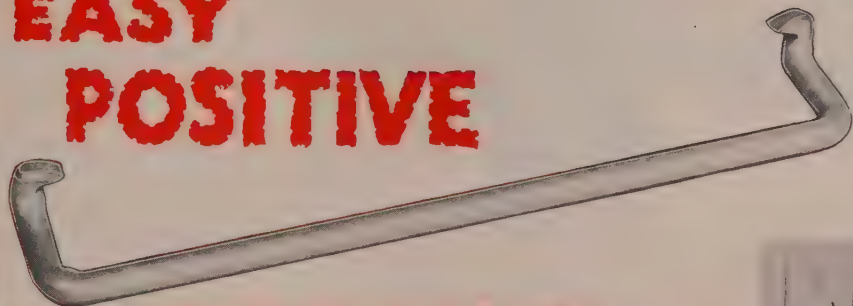
March 1-4—Associated General Contractors, 35th annual convention at Statler Hotel, Los Angeles.

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

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ENGINEERS ON THE MOVE

Succeeding **Walter L. Huber**, San Francisco, as national president of ASCE, **Daniel V. Terrell** was installed at the Society's annual meeting in October. **Samuel B. Morris**, manager and chief engineer of the Los Angeles Department of Water and Power, was named director from District 11.

Robert Haselwood recently resigned as city engineer of Tulelake, Calif., to accept a similar position in Anchorage, Alaska. **Jack Kardell** is appointed his successor at Tulelake.

C. W. Patton is manager of the district office of The California Oregon Power Co. at Yreka, Calif. Formerly with CAA and the Missouri Highway Department, he has handled hydro construction on the North Umpqua projects of the power company.



Brig. Gen. Don G. Shingler, new North Pacific Division Engineer (See item below)

Brig. Gen. Emerson C. Itschner, North Pacific Division Engineer at Portland since 1952, succeeds **Brig. Gen. C. H. Chorpene** as Assistant Chief of Engineers for Civil Works in Washington, D. C. **Brig. Gen. Don G. Shingler** succeeds General Itschner as North Pacific Division Engineer.

Richard P. Wilson, formerly with the Corps of Engineers in San Francisco, is attached to the District Public Works Office, 12th Naval District, San Bruno, Calif.

Marshall Jones, chief of the Bureau of Reclamation office at Chico, Calif., has been named city engineer for the City of Oroville, effective next January. The Bureau's Chico office is now a field office, with **J. W. Carniglia** in charge.

Burhl M. Scruggs is in the Paving Inspection and Testing Division of the Bureau of Yards and Docks, 12th Naval District, serving as general engineer at San Bruno, Calif. He

has had 20 years' experience with government services, including two years in the Army. From 1940 until June 1952 he was employed at Pearl Harbor, T. H.



Donald H. Herak holds a new post with the Portland Cement Association (See item below)

Donald H. Herak has been named to replace **Robert E. Tobin** as district engineer for the Portland Cement Association at Spokane, Wash. Tobin resigned to become engineering consultant for Spokane Concrete Pipe Co.

With the completion of the Hungry Horse Project in Montana, a large number of engineers are scattering to other Bureau of Reclamation projects. **Carl Pirnack**, inspector, has transferred to the San Diego Project, while the following have gone to the Minidoka Project at Burley, Idaho: **Duane Scoular**, inspector; **Lou Fretwell**, CE; **William Taylor**, surveyor and **Robert Campbell**, CE. Among those moving to the Palisades Project in Idaho are **Phil Young**, **Harry Cornish** and **Fred Sieber**, electrical engineers. **James Lee** of Columbia Falls, inspector at Hungry Horse, has resigned from the Bureau.

J. F. Barrett and **H. H. Hilp** of the firm of Barrett & Hilp, San Francisco, recently announced their intention of engaging in the construction business as separate corporations. Formation of the corporation of Hilp & Rhodes was subsequently announced, with **Harry H. Hilp, Sr.**, **Theodore Rhodes** and **Harry H. Hilp, Jr.**, as members of the general contracting firm. As yet, no announcement has been made of the formation of the Barrett company.

Among the Bureau of Reclamation engineers receiving assignments as advisers to foreign countries under the Foreign Operations Administration are: **Frank Tessitor** of Denver, to Pakistan; **Walter B. Bierce** of Amarillo, Texas, to Iran; **George T. L. Wongwai**, engineering geologist

on the Colorado-Big Thompson, to Ethiopia, and **Roy E. Goss** of Yuma, Ariz., to Iraq.

Paul Walker, city engineer of Penticton, B. C., was recently elected chairman of the Municipal Engineers' Division of the British Columbia Engineering Society at the annual convention in Vancouver.

Weld Standards available

A SET of Weld Standards to enable engineers to acquire both cost and quality control over welding operations is available from The Lincoln Electric Co., Cleveland 17, Ohio, for the price of \$1.00. Printed on tracing paper so that they can be blue-printed or otherwise reproduced for the purpose of providing a standard for communication welding procedure on drawings, the standards are based on procedures developed by Lincoln and the weld symbols of the American Welding Society. These standards help assure engineers and designers in designing for welded machines or structures that the welds specified are made as specified. They specify according to plate thickness both the type and size of weld as well as how it should be made. With both engineering and shop using the same standards and having prints of the standards available at all times, the engineer can be assured that the weld he has specified will produce the results for which it was designed. For a specified plate thickness Weld Standards give the electrode type and size, the polarity and current, electrode melt-off rate, arc speed, number of passes or beads, feet of joint welded per hr., and the pounds of electrode required per ft. of weld. All of these factors are specified by using the Weld Standard designation in conjunction with the regular American Welding Society symbol. Standards have been prepared for manual welding of butt welds, fillet welds, lap and corner welds in all positions in both plate and sheet metal.

A special meeting of the recently formed Central Valley Subsection of the ASCE was held at the Calaveras Cement Co. plant, San Andreas, Calif. **Walter Shulz**, president of the Sacramento Section, presided. The following were installed as charter officers: President, **John G. Meyer**, district engineer for the State Division of Highways at Stockton; vice presi-

ent, **Felix A. Wallace**, head of the Department of Engineering at College of the Pacific; secretary, **Frank Lucas**, associate state highway engineer at Stockton; treasurer, **Harry M. Moses**, civil engineer for the Bureau of Reclamation, Stockton, and board-member-at-large, **J. Don Layton** of the City of Stockton engineering department.

N. B. Bennett, formerly deputy Wyoming state engineer, became head of the Bureau of Reclamation's project planning office in Washington on Oct. 1. **G. W. Dixon** became his aide, according to the announcement by **Wilbur Dexheimer**, Commissioner.

Richard K. Durant, Bureau of Reclamation construction engineer, is heading up an organization to build a dam, pumping plants, canals and other works as part of the Sacramento Valley Canals Unit of the Central Valley Project. Durant has been with the USBR fourteen years, having worked as construction engineer on Friant Dam, Madera and Friant-Kern canals and the San Joaquin Valley Distribution systems.

DEATHS

John Shepherd, 73, president of the Nevada Concrete Pipe Co. of Sparks, Nev., died at his home in Marysville, Calif., on September 7.

Albert W. Clark, 71, died suddenly of a heart attack in Spokane, Wash., Sept. 25. He was one of the organizers of the construction firm of Hazen & Clark. Five years ago he left the firm and has been an inspector for a construction company.

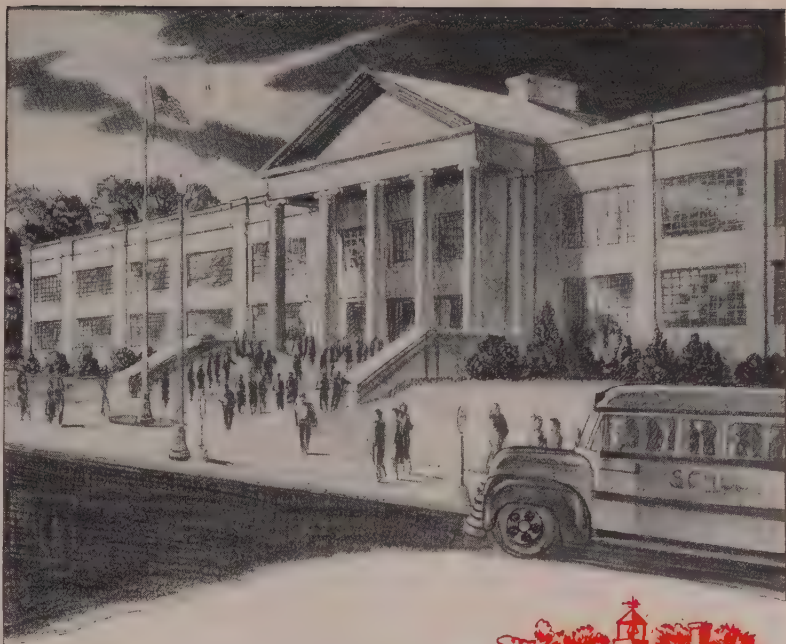
George W. Wescott, 68, distribution engineer for Utah Power & Light Co., died September 11 at his home in Salt Lake City.

Franklin D. Howell, 86, engineer and former Los Angeles city official, died September 10 in that city.

Robert N. Christiansen, 43, civil engineer and formerly assistant city engineer of Santa Ana, Calif., died in Los Angeles, September 8.

Frank J. Harper, 62, contractor of Wallace, Idaho, and his wife were both killed in an automobile accident near Wallace.

Percy W. Hall, 77, retired construction engineer, died September 2 in Oakland, Calif., after a long illness.



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SUPERVISING THE JOBS

Richard L. Gardner, assisted by Warren E. Gardner, is superintending a \$342,685 job consisting of 12 mi. of grading and structures to replace the No. Washington St. artery in Denver. Overseer for the project is John B. Tipton. Gardner Construction Co. is the contractor.

George McCoy, Jr., has the general superintendent spot on the \$4,122,382 contract awarded Guy F. Atkinson Co. for construction of a new highway paralleling the existing Waldo approach from Golden Gate Bridge to a point near Richardson Bay bridge in Marin County, Calif., including a new tunnel adjoining the present one. This 4-mi. freeway approach constitutes the largest single highway contract in California history.

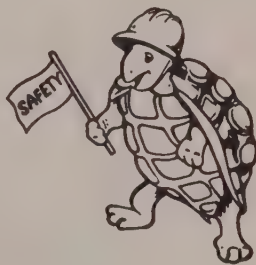
R. J. Scalzo and Primo Raghianti are supervising the Thomas Scalzo Co. \$151,843 contract for grading, surfacing and concrete undercrossing work on State Highway 1, in Mount Vernon, Wash. Other key men on the job are J. Carpine, drainage foreman, and Ralph Curtin, master mechanic, assisted by Hank Heinberg.

Emil Bettiga is supervising the construction of a sewage treatment plant at Paso Robles, Calif., contract for which was recently awarded C. Norman Peterson, Inc., on a bid of \$201,735. Cliff Peterson is foreman on the same job.

A. H. Bauer is superintending the relocation of Highway 99, 4½ mi. north of Dunsmuir, Calif., for A. Teichert & Son, Inc., who secured the \$1,048,738 contract, soon to be completed. Among key personnel on the

job are: foremen, C. J. Homan and E. O. Kelley, grade; Monte Quijoda, pipe; C. E. Cook, structures; Harry Willsey, labor; Glenn Severtson, field mechanic; Donald McCoy, welding; Chuck Waters, lube, and Ray Bladen, utility. Ben Acquestapace is master mechanic, and L. M. Seward, mechanic. Don E. Brown is engineer and the office manager is W. A. Peckham. Ray Wilson is resident engineer for the state.

Are you qualified for membership in the "Turtle Club"?



The exclusive club known as the "Turtle Club" was organized some years ago for the purpose of encouraging the wearing of head protection by all workers exposed to falling objects. The only requirement for membership is written proof that your life was saved by the wearing of a hard hat.

Application for membership in the club may be secured by writing:

KEY MEN on the job for an A. Teichert & Son, Inc. contract near Dunsmuir, Calif., are: (from left) A. H. Bauer, Don E. Brown, Glenn Severtson, C. J. Homan, and Chuck Waters. See accompanying item for more details.

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

New members receiving lapel pins in the form of a turtle and a certificate citing the circumstances of their escape from serious bodily harm by a hard hat are:

Joe B. Moyer, of the Bechtel Corporation, on Aug. 5, 1953, at Pittsburg, Calif., was rigging some wire rope around a piece of concrete pipe and while stooping over a shackle fell from the top of the pipe, striking his safety hat. Though the hat was dented, Moyer suffered nothing more than a lacerated scalp, sustained no permanent ill effect, and lost no time from work.

Willard E. Smalley of the U. S. Forest Service, while fighting a fire in Lassen National Forest, Calif., on June 21, 1953, was struck by the butt end of a burning limb which had fallen from a height of 40 ft. The limb weighed about 20 lb. The members of his crew who witnessed the accident agree that he was saved from serious, if not fatal injury by his hard hat. No time was lost from work as a result of the accident.

Richard T. Kruse, also of the U. S. Forest Service, while fighting a forest fire in Lassen on July 18, 1953, was preparing to fell a large snag with a power saw. An overhead limb, weighing about 55 lb., fell and struck Kruse on the head and shoulders. Though warned of the falling limb, he slipped and fell before he could escape, sustaining a large bruise on his head, a broken shoulder and some shock, and spent eight days in the hospital. But his crew members agree that because he had remembered to put on his hard hat his life was saved.

Ernest Bowcut is supervising a job in Bountiful, Utah, for the Waterfall Construction Co., who on a bid of \$173,746 received the award for the construction of sidewalks, curbs and gutters.

Rudy Buhlman is superintendent for J. H. Pomeroy & Co., Inc., on the new Ford assembly plant being erected at Milpitas, Calif. C. C. Bald-



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LOCATION: Cape Girardeau, Mo.

OPERATING CONDITIONS: Drilling in platin formation of limestone.

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But they may *not* be the best answer for all your drilling problems!

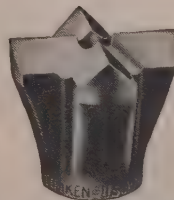
When the ground is hard and abrasive, Timken carbide insert bits give the highest speed. They're most economical for constant-gage holes, small diameter blast holes, extremely deep holes.

Most important of all, both Timken carbide insert and multi-use bits are interchangeable in the same thread series. A wide range of different Timken bits fit the same drill steel. You change bits quickly, easily as the ground changes—right on the job!

Both Timken carbide and multi-use bits are made from electric furnace Timken fine alloy steel and have

special shoulder unions, originated by Timken, that protect threads from drilling impact.

To find out the bit type most suited to your drilling needs—whether multi-use, carbide insert, or both—call on the Timken Rock Bit Engineering Service. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



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HAPPY with Rogers & Babler Bros.' progress on the Seward highway in Alaska are (left picture, l. to r.) **Howard M. Christenson**, resident engineer for the BPR; **Howard McInroe**, crushing and grading superintendent for the contractor; **A. K. Neeley**, district construction and maintenance engineer for the BPR; and **Lawrence S. Dupuis**, assistant superintendent for Rogers & Babler Bros. Right picture shows Neeley talking things over with **Jim Folston**, who is running the paving operation for the contractor. A full story on this job was in *Western Construction*, October 1953, pp. 77-79.

win is project manager; **Barney C. Trover**, project engineer; **Hank Naegele**, office manager; **Jim Huston**, sub-contract manager, and **George Devaney** is field engineer with a crew of 25. Among the other key personnel on the job are: foremen—**Walter Small**, carpenter; **Frank Mayo**, general labor; **Neil McNatt**, labor (utilities); **Mike Plesha**, concrete; **Joe Braga**, cement finisher; **Emory Tiffen**, equipment, and **H. (Rusty) Buhlman**, mill. **Marvin Lokkesmoe** is detailer, and **Pat Kisich** is purchasing agent. **Leo W. Ruth** is in charge of survey work for **James & Watson**, San Jose, Calif.

Budd Curtis, job superintendent; **G. E. Lefler**, project manager, and **H. E. Gall**, general superintendent, are the top supervisory personnel for **Patti-MacDonald Construction Co.**, who received the \$2,850,000 contract to build high school facilities at Anchorage, Alaska.

Boyd L. Christensen is job superintendent on the \$6,112,015 contract recently awarded to the joint venture firm of **Morrison-Knudsen Co., Inc.**, and **J. A. Terteling & Sons, Inc.**, for the construction of runways, taxi-

ways and lighting and utility systems at Mountain Home Air Force Base, Idaho. Excavation superintendent is **Russ Healey**; master mechanic, **Sam Barta**; and office manager, **Evan Hendricks**.

John Foster is superintendent and **Robert Petrie** is project engineer for **S & Q Construction Co.** on construction of interceptor sewers, pumping station, etc., in Mill Valley, Calif., a \$165,400 contract recently awarded.

Tom Benson, with the assistance of foreman **Harry Gammelgard**, is superintending the erection of a high school project at Antioch, Calif., for **The Pacific Company**, holder of the \$1,669,000 contract.

Bert Norris is supervising for **Peter Kiewit Sons' Co.** on their \$682,000 contract for Lake of the Woods highway construction at Klamath Falls, Ore., work on which is drawing to a close. Among the important personnel at the site are: Superintendents—**Ed Ross**, oiling; **Al Davis**, structures, and **Al Herring** and **Stan Matthews**, assistants. Among the other key personnel are excavating foreman **Bert Bush**; oil foreman **Van Eggle-**

SOME of the men on the job for **Peter Kiewit Sons' Co.** on a highway contract near Klamath Falls, Ore., are (l. to r.) **Al Davis**, **Bert Norris**, **Al Herring**, and **Bert Bush**. (See accompanying item for more information.)



ston and blasting foreman **Vernon**; master mechanic **George Lotz**; field mechanic **Lester Simmons**; and engineer **George Budka**. **Lynn Everson** is resident engineer. The office is in charge of **Tom Hatcher**.

Gregg H. Osborne is construction superintendent for the **Bonneville Power Administration** on this agency's Big Cliff-Detroit transmission line in Oregon.

Harry Woods is superintendent on the **Inland Construction Co.**'s \$132,-776 contract for road work in Rocky Mountain National Park, Colo. **A. B. Nuss** is Colorado-Wyoming manager for the company.

Carl Rufenack is superintending the work of grading, draining, surfacing and oiling of 4.4 mi. of Round Butte-Ronan highway in Montana for **Ed Tangmo**, holder of the \$173,921 contract. Other key men working for the contractor are **R. M. Callaghan**, **A. C. Jensen** and **Al Knepp**.

Carl Harris is directing the construction of earthwork, pipelines and structures on Schedules 1, 2 and 3 of the Delta-Mendota Canal distribution system, for **Stolte, Inc.**, the contractor who received the \$441,893 award. **Maurice R. McClure** is manager of the utility department and **Fred Harbick** is job manager and in charge of purchasing.

A. G. (Andy) Allen is supervising a 7.7-mi. grading and bituminous surfacing job in Grant County, Wash., for the **Ellis Construction Co.** **William F. Sloan** is foreman. This \$227,-733 project is just about completed.

Roy R. Friedrichs is engineer on construction of Pit 4 powerhouse for the **Pacific Gas & Electric Co.**

Joe M. Heckman is superintending the erection of the First National Bank Building at El Cajon, Calif., for **Trepte Construction Co.**

Walter Trainer has the superintendent spot for the **Montana Concrete Pipe Co.**, Great Falls, Mont., in the erection of a pumice and concrete block plant. Plant is scheduled to be in operation early in 1954.

C. J. Painter is job superintendent for **Oris Williams & Co.** on a \$490,285 contract covering construction of 23 mi. of unlined canals on the Columbia Basin Project 8 mi. north of Corfu, Wash. Painter is being assisted by earthwork foreman **Art Sime** and concrete foreman **Jesse Henshaw**. On the company's Talley Lake job in

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of New England
goes

"Century" asbestos-cement pipe

One of the latest installations of "Century" asbestos-cement pressure pipe is at South Hadley Falls, Mass. As with other "Century" installations in rocky New England soil—"the digging was tough, but the laying was easy."

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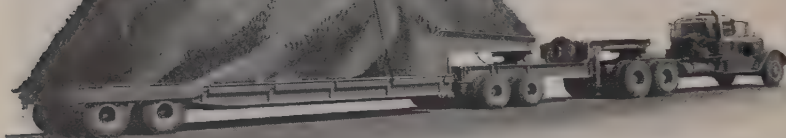
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Blackie Scriven, chief electrical superintendent for Merritt-Savin, prime contractor on Folsom Dam, has set up a dandy vibrator maintenance program on his job. The full story is on pages 74-75 of this issue.

Montana the following men are working: **L. W. Minnis**, superintendent; **Sidney Wright** and **George Mosebar**, foremen, and **Elmer Rada**, head mechanic.

Loren N. Adkins is resident engineer for the U. S. Bureau of Public Roads on highway work consisting of subgrade reinforcement and bituminous surfacing on the Victor-Irwin project in Idaho.

Martin Keeble, assisted by **John Matus**, is superintending a grading and surfacing project in Santa Cruz County, Calif. **Fred Card** is head mechanic on the job. This contract was awarded recently to Edward Keeble at \$316,057.

L. N. Minnis is superintending the \$225,890 contract recently awarded Otis Williams & Co. for the construction of various roads north of Kalispell, Mont. **Sid Wright** is job foreman and **George Mosebar** is equipment foreman.

E. L. Thiemens is Sather & Sons' superintendent on the work of grading and surfacing approaches to Greer bridge in Lewis and Clearwater counties in Idaho. Sather received the award on a bid of \$129,695.

Paul Cleary, as superintendent, is in charge of R. J. Noble Co.'s \$352,287 contract for grading and surfacing 3.2 mi., Huntington Beach Blvd. in Orange County, Calif.

Charles Luttrell is job superintendent on the 12.1-mi. grading, draining and surfacing road job, Roswell-Frazier in Chaves County, New Mex., contract for which was recently awarded to Jack Adams on a \$297,192 bid.

Ralph J. Jones, assisted by foremen **Harvey L. Martin** and **Andrew Christiansen**, is superintending a job in

Ogden, Utah, for Morrison-Knudsen Co., Inc. This is a \$175,000 contract for grading, new track yard and apartment facilities.

Arden Acton is supervising Taggart Construction Co.'s contract for grading and surfacing 5½ mi. Hoback Canyon road, Teton National Forest, Wyo., a \$492,003 contract. He is being assisted by foremen: **Gale George** and **G. L. Acton**, grade; **Lewis Corch** and **Dan Connert**, labor; **Glen Harvey**, pipe. **Tim Rickman** is the master mechanic. **George Monighan** is in charge of the office.



C. E. Murphrey (left) and **A. Cathey** (see item below)

Andrew Cathey is Eaton & Smith's superintendent on a state highway job near Forest Mountain summit, Calif. **C. E. Murphrey** is master mechanic and **H. W. Franz**, lubricating engineer. **W. H. Jackson** is job engineer.

James S. White, superintendent for Webb & White, heads up a \$184,038 contract recently awarded this firm for the erection of a structural steel and concrete bridge and approaches on U. S. 101 south of San Clemente, Calif. **Frank Liston** is grading foreman and **Paul Fredrickson** is carpenter foreman.

Robert Phillips, superintendent, is supervising a highway project in Box Elder County, Utah, for Jack B. Parson Construction Co. Foremen on this \$299,142 job are: grade, **Grant Collett** and **Ronald Hadfield**; bituminous surfacing, **Paul Garner**.

Glenn D. Estes is superintendent for contractor J. W. Thomas on a state highway job at Medford, Ore. **Lee Mattson** is assisting Estes. Resident engineer on this \$255,000 contract is **Walt Merrill**.

Leonard Bicker, assisted by **Robert Heath** is superintending a \$100,000 asphalt paving contract held by Acme Constructing Co. Job is just about completing.

... Continued on page 127



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AR-23

CONTRACTS

Summary of bids and awards for major Western projects

Alaska

- \$1,024,000—**Decco Construction Co.**, New York City—Award for temporary docking facilities, Port of Whittier; by C. of E.
- \$2,796,073—**Lease & Leighland and M-B Construction Co.**, 1501 W. 35th St., Seattle—Award for outside utilities, POL laboratory, etc., and paving, Fort Richardson; by C. of E.
- \$2,642,090—**S. Macri Construction Co.**, Box 938, Anchorage—Low bid for paving streets and sidewalks and construction of storm drainage facilities, Elmendorf AFB; by C. of E.
- \$318,355—**S. Macri Construction Co.**, Box 938, Anchorage—Low bid for watermain extensions and replacements, Anchorage; by Alaska Public Works.
- \$745,290—**Morrison-Knudsen Co., Inc.**, Box 320, Anchorage—Low bid for 6 mi. of Glacier Hwy.; by BPR.
- \$886,945—**Morrison-Knudsen Co., Inc.**, Box 320, Anchorage—Award for 39 underground reinf. conc. ammunition storage igloos, 7 P.C.C. storage pads and about 8,500 ft. of access rd., Ft. Richardson; by C. of E.
- \$2,165,532—**Morrison-Knudsen Co., Inc.**, 603 Hoge Bldg., Seattle—Award for bulk liquid fuel storage and hydrant refueling facilities, Ladd AFB; by C. of E.
- \$2,594,230—**Morrison-Knudsen Co., Inc.**, 603 Hoge Bldg., Seattle—Low bid for roads, streets, parking areas and sidewalks, Eielson AFB; by C. of E.
- \$1,350,767—**Schmid & Lewis**, 2604 W. Lynn St., Seattle—Low bid for general depot warehouse with outside utilities, Ft. Richardson; by C. of E.
- \$29,001,281—**Williams Bros. Construction Co.**, 324 National Bank Bldg., Tulsa, Okla., **McLaughlin, Inc.**, and **Marwell Construction Co.**—Low bid for 615-mi. oil pipeline, Haines to Fairbanks; by C. of E.

Arizona

- \$296,970—**Copper State Construction Co.**, Box 863, Mesa—Low bid for 6.8 mi. of grading, draining, select material, aggregate base and bitum. plant mix, U. S. 80 near Mohawk; by St. Hwy. Dept.
- \$144,296—**Isbell Construction Co.**, Box 958, Phoenix—Low bid for 4¼ mi. of subgrade seal, select material, aggregate base and bitum. surf., U. S. 66 beginning 16 mi. west of Ashfork; by St. Hwy. Dept.
- \$156,830—**Rankin & Booth**, 2500 Sixth Ave., Yuma—Low bid for runway extensions and taxiways, Williams AFB; by C. of E.
- \$184,153—**Royden Construction Co.**, Box 3707, Phoenix—Low bid for 3.7 mi. of grading and draining and furnishing and placing select material, U. S. 260 betw. Concho and St. Johns; by St. Hwy. Dept.

California

- \$204,095—**Christie Co.**, 23 Santa Clara St., Arcadia—Low bid for sewage disposal plant and outfall sewer, Camp Irwin, Barstow; by C. of E.
- \$1,519,700—**Coast Pipeline Contractors**, 580 Bragato Rd., Belmont—Low bid for West Orange feeder for Colorado River Aqueduct feeder system, incl. 8.6 mi. of 43-in. diameter pipe line, Los Angeles; by Metropolitan Water District of Southern Calif.
- \$259,361—**Concrete Supply Co.**, Box 778, Merced—Low bid for 3.9 mi. of widening and resurf., Sign Rt. 140 betw. 10 mi. west of Merced and Merced, widening 2 reinf. conc. bridges,

and construction of 1 reinf. conc. bridge, Merced County; by Div. of Hwys.

\$603,305—**Eaton & Smith**, 1215 Michigan St., San Francisco—Award for grading and bridges nr. Shaver Lake, Sierra Natl. Forest, Fresno County; by BPR.

\$196,380—**Gallagher & Burk**, 344 High St., Oakland—Award for improvements on Park Blvd., Excelsior and Greenwood sts., Oakland; by City.

\$3,896,180—**General Electric Co.**, 212 N. Vignes St., Los Angeles—Award for furnishing and erecting steam generator unit, Valley Steam Plant, Sun Valley, Los Angeles; by Los Angeles Dept. of Water & Power.

\$418,000—**M. H. Golden Construction Co.**, 3485 Noel St., San Diego—Award for seaplane ramp and floating wharf, San Diego; by Consolidated Vultee Aircraft Corp.

\$499,353—**Granite Construction Co.**, Box 900, Watsonville—Award for 3.8 mi. of grading and P.C.C. paving on cement treated subgrade, betw. 2 mi. north of Gonzales and Chualar, Monterey County; by Div. of Hwys.

\$171,150—**E. T. Haas Co.**, Box 95, Belmont—Low bid for pipe line and water system, Castroville; by Castroville County Water District.

\$3,680,237—**Chas. L. Harney, Inc.**, 575 Berry St., San Francisco—Award for 2 adjacent steel and reinf. conc. structures and grading and surf. 4 approach ramps, Bayshore Freeway betw. 8th St. and 4th St., San Francisco; by Div. of Hwys.

\$325,825—**Lee J. Immel**, 3030 San Pablo Ave., San Pablo—Low bid for surfacing streets in 3rd assessment district, El Cerrito; by City.

\$642,875—**M. F. Kemper Construction Co.**, 3701 Overland Ave., Los Angeles—Award for circulating water piping and appurtenances, Valley Steam Plant, Sun Valley, Los Angeles; by Los Angeles Dept. of Water & Power.

\$294,738—**MacDonald-Young & Nelson, Inc.**, 351 California St., San Francisco—Low bid for structure over Santa Fe tracks and another over San Pablo Creek, Contra Costa County; by Div. of Hwys.

\$695,878—**Madonna Construction Co.**, Box 910, San Luis Obispo—Low bid for 7.3 mi. of grading and paving and 2 reinf. conc. bridges, Sign Rt. 41, San Luis Obispo County; by Div. of Hwys.

\$551,230—**Matich Bros. and Lowe & Watson**, Box 390, Colton—Low bid for Schedules A, C, and D, runway and taxiway extensions, Norton AFB, San Bernardino; by C. of E.

\$576,695—**Monson Bros.**, 475 Sixth St., San Francisco—Award for Summit Reservoir, San Francisco; by City.

\$3,149,430—**H. B. Nicholson, James L. Ferry and N. P. Van Valkenburg**, 880 E. Colorado St., Pasadena—Low bid for 5 steel plate pump delivery pipe lines on Colorado River Aqueduct, San Bernardino and Riverside counties; by Metropolitan Water District of So. Calif.

\$508,128—**Nomellini Construction Co.**, Box 1177, Stockton—Award for earthwork and structures, lateral and sublaterals, Northern Section, Unit No. 3, Part 2, Madera Distr. System; by USBR.

\$1,094,357—**J. A. Payton Co.**, Box 207, Riverside—Award for about 3.9 mi. of grading and P.M.S. surf. on cement-treated base and 2 reinf. conc. bridges to provide a 4-lane divided freeway, between Mexican border and south of Nestor, San Diego County; by Div. of Hwys.

\$495,265—**Pipeline Construction Co.**, 2391 Main St., Riverside—Low bid for East Perris Valley-Romeland supply line, Hemet; by Eastern Municipal Water District.

\$334,660—**Prodanovich & Krzich & Rodrigues**, 750 81st Ave., Oakland—Low bid for interceptor sewers, San Pablo; by San Pablo Sanitary District.

\$324,995—**A. J. Raisch Paving Co.**, 900 W. San Carlos St., San Jose—Award for bitum. overlay over pavement, Moffett Field; by U. S. Navy.

\$3,188,000—**Richards Construction Co.**, Box 1187, Studio City—Low bid for Pacoima low-rent housing project, Pacoima; by Housing Authority of City of Los Angeles.

\$372,230—**Stolte, Inc.**, 8451 San Leandro St., Oakland—Low bid for conduits and sewers, St. 5 to Cypress St., Oakland; by City.

\$234,935—**Robert Vlachich**, 2901 Worthen Ave., Los Angeles—Low bid for sanitary sewers, Grandeur Ave., et al, Altadena; by Los Angeles County.

759,745—**Vinnell Co., Inc.**, 1145 Westminster Ave., Alhambra—Award for Firestone-Downey storm drain, Project 18, outh Gate; by Los Angeles County Flood Control District.
1,252,000—**R. A. Wattson Co.**, 12550 Satcoy St., North Hollywood—Award for Project 146, Central Ave., Glendale Ave., and portion of Project 60, Topico storm drains, Glendale; by Los Angeles County Flood Control District.

\$223,286—**Webb & White**, 7220½ Melrose Ave., Los Angeles—Low bid for grading and paving ramps on the Santa Ana Freeway betw. Ramona Freeway and 7th St., Los Angeles; by Div. of Hwys.

\$545,563—**J. E. Young Pipe Line Contracting Co.**, 931 E. Rosecrans Ave., Los Angeles—Low bid for earthwork and structures, Goleta Distribution System, Cachuma Project; by USBR.

Colorado

\$352,116—**Boatright-Smith**, Box 554, Rawlins, Wyo.—Award for 7.6 mi. forest rd., White River Natl. Forest, Rio Blanco County; by BPR.

\$127,455—**C. M. Hanes Construction Co.**, 110 W. 13th Ave., Denver—Award for bridge crossing S. Platte River at W. Mississippi Ave., Denver; by City and County of Denver.

\$502,245—**Western Paving Construction Co.**, 5105 Washington St., Denver—Award for strengthening taxiways and parking aprons, Lowry AFB, Denver; by C. of E.

Idaho

\$372,108—**Clifton & Applegate**, Yardley, Wash.—Award for 2.2 mi. of heavy grading and road-mixed bitum. surf., Clarks Fork hwy. betw. Oden and Pack River, Bonner County; by St. Dept. of Hwys.

\$143,595—**Eagle Construction Co.**, Eagle—Award for Pierce to Kelly Creek rd.; by BPR.

\$132,498—**Marion J. Hess**, Box 247, Malad—Award for 6.7 mi. of grading and road-mixed bitum. surf., Parker-Thornton rd., Burton Loop section, and road-mixed bitum. surf. on 2.2 mi. of Moody rd., Madison and Fremont counties; by St. Dept. of Hwys.

\$194,692—**Kenaston & Huntley**, Lewiston—Award for 2 conc. bridges and bitum. surf. approaches, Spalding-Kendrick hwy. through Kendrick and Juliaetta, Latah County; by St. Dept. of Hwys.

\$412,180—**Peter Kiewit Sons' Co.**, Idaho Falls—Award for 7.2 mi. of grading and bitum. surf., U. S. 93 from Meteor to Point Ranch, Twin Falls County; by St. Dept. of Hwys.

\$125,615—**Materne Bros.**, W. 1204 Francis Ave., Spokane—Award for 8.7 mi. of grading and surf., Priest River rd.; by BPR.

\$274,500—**Miller & Strong, Inc.**, 3871 Royal Rd., Eugene, Ore.—Low bid for Lewis and Clark hwy. project, Idaho County; by BPR.

\$235,935—**Twin Falls Construction Co.**, Box 1081, Twin Falls—Award for 7.2 mi. of grading and road-mixed bitum. surf., Roosevelt hwy., Springfield East and West, Bingham County; by St. Dept. of Hwys.

Montana

\$414,800—**McLaughlin, Inc.**, 331 Ford Bldg., Great Falls—Low bid for 12 mi. of grading and surf., Many Glacier rd., Glacier Natl. Park; by BPR.

\$116,450—**McLaughlin, Inc.**, 331 Ford Bldg., Great Falls—Award for 7.2 mi. of grading, gravel surf., and draining, Jackson-Dillon hwy., Beaverhead County; by St. Hwy. Comm.

\$153,070—**Nilson-Smith Construction Co.**, Box 1147, Great Falls—Award for paving on Hauser Blvd., Helena; by City.

\$20,500,000—**Ross & Powers Construction Co.**, Billings; **Associated Pipe Line Contractors**, 3272 Westheimer St., Houston, Tex.; **Eastern Pipeline Contractors**, Mercantile Natl. Bank Bldg., Dallas, Tex., and **Engineers Ltd. Pipeline Co.**, 2040 S. Navajo St., Denver, Colo.—Total awards for a 537-mi. 10-in. oil pipeline from Billings, Mont., to Spokane, Wash.; by Continental Pipe Line Co.

\$292,675—**Union Construction Co.**, Missoula—Low bid for Swan River hwy. project, Flathead Natl. Forest, Missoula County; by BPR.

Nevada

\$388,637—**Silver State Construction Co., Inc.**, Fallon—Low bid for 13.1 mi. of grading, draining and surf., U. S. 95 beg. 1 mi. northwest of Babbitt, Mineral County; by St. Dept. of Hwys.

\$188,353—**Young & Smith Construction Co.**, 306 Beason Bldg., Salt Lake City—Award for 13.7 mi. of grading, draining and gravel surf., 9½ mi. north of Basalt to junction with U. S. 95, Mineral County; by St. Dept. of Hwys.

New Mexico

\$141,200—**Floyd Haake**, Box 4035, Santa Fe—Low bid for alert apron and taxiway, Walker AFB, Roswell; by C. of E.

\$1,810,700—**Robert E. McKee, General Contractor, Inc.**, 1918 Texas St., El Paso, Tex.—Low bid for additional bldgs. at state insane asylum, Las Vegas; by State.

Oregon

\$498,345—**Babler Bros.**, 4617 S.E. Milwaukie Ave., Portland—Award for 4.2 mi. of grading and base, Winchester-South Umpqua River unit, Deady-Shady section, Pacific Hwy. north from Roseburg, Douglas County; by St. Hwy. Comm.

\$472,732—**J. W. Briggs & Associates**, Bend—Award for 12.6 mi. of grading and paving, South unit, Bend-Lapine section of The Dalles-California Hwy., Deschutes County; by St. Hwy. Comm.

\$771,530—**Coates Electric Manufacturing Co., Inc.**, and **Marine Industrial Supply Co.**, 3610 First St. So., Seattle—Low bid for installation of equipment and completion of powerhouse, Lookout Point; by C. of E.

\$182,325—**C. J. Eldon**, Box 5686, Portland—Award for 2 mi. of grading and a 260-ft. conc. bridge, Panther Creek rd., Douglas County; by BPR.

\$339,750—**Funderburk Construction Co.**, Sutherlin—Award for grading, Indian Ridge loop rd., Lane County; by BPR.

\$632,794—**R. A. Heintz Construction Co.**, 211 N.E. Columbia Blvd., Portland—Award for 11.8 mi. of grading, Willamette River-Hayesville section of Portland-Salem Expressway, west of Aurora, Hubbard and Woodburn; Marion and Clackamas counties; by St. Hwy. Comm.

\$862,226—**Peter Kiewit Sons' Co.**, 765 Douglas St., Longview, Wash.—Award for 5.4 mi. of grading and paving, Rocky Point-Brush Creek section, Oregon Coast Hwy. about 2.4 mi. south of Port Orford, Curry County; by St. Hwy. Comm.

\$531,220—**George W. Lind**, 5000 N.E. Killingsworth, Portland—Low bid for laterals for west central unit of sewer in northwest Portland; by City.

\$748,150—**P. S. Lord Mechanical Contractor**, 4507 S.E. Milwaukie Ave., Portland—Low bid for 20 mi. of sewer lines and laterals, Portland; by City.

\$1,000,000—**Montgomery Electric Co.**, 3275 N.W. Thurman St., Portland—Award for power substation and transmission line nr. Klamath Falls, Josephine County; by California-Oregon Power Co.

\$450,000 (est.)—**Morrison-Knudsen Co., Inc.**, 212 S.E. 1st St., Pendleton—Award for 8.5 mi. access road by Oak Grove fork of Clackamas River; by Portland General Electric Co.

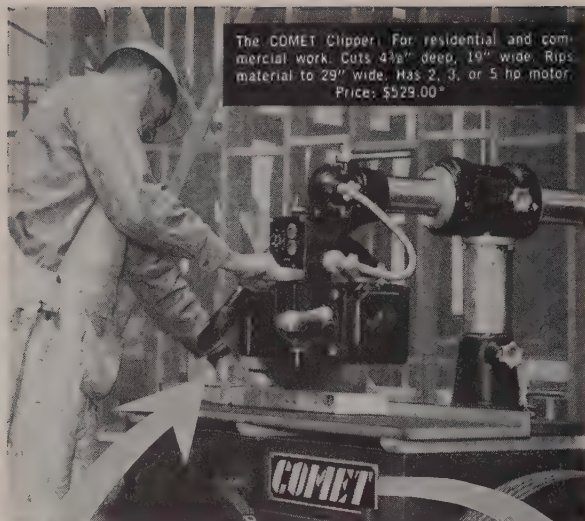
\$479,406—**Parker-Schram Co.**, 200 Builders Exchange Bldg., Portland—Award for 3.2 mi. of grading, Fairgrounds-Shady unit, Deady-Shady section, Pacific Hwy. south from Roseburg, Douglas County; by St. Hwy. Comm.

\$292,527—**Parker-Schram Co.**, 200 Builders Exchange Bldg., Portland—Award for 0.6 mi. of grading and paving and a 266-ft. reinf. conc. structure, beginning about 2.8 mi. south of Portland on the Portland-Salem Expressway, Multnomah County; by St. Hwy. Comm.

\$592,870—**Rogers Construction Co.**, 11760 N.E. Glisan, Portland—Award for 9.3 mi. of grading, Glenwood-North Plains section, Wilson River Hwy., Washington County; by St. Hwy. Comm.

\$250,212—**Rogers Construction Co.**, 11760 N.E. Glisan, Portland—Award for 3.5 mi. of grading and paving, Crooked River-Terrebonne section, The Dalles-California Hwy. north from Terrebonne, Deschutes County; by St. Hwy. Comm.

\$371,255—**John R. Sexton**, Clatskanie—Award for surf., North Umpqua Hwy. Project 47-A3; by BPR.

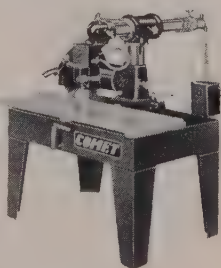


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\$618,495—**Fred H. Slate Co., Oregon Ltd., and E. C. Hall Co.**, 7805 S.W. 40th Ave., Portland—Award for 3.2 mi. of grading and paving, North unit, Elbow Lake-Gardiner section, Oregon Coast Hwy., Douglas County; by St. Hwy. Comm.

\$234,805—**J. R. Taggart**, Salem—Award for 4.3 mi. of grading and paving, North unit, Elbow Lake-Gardiner section, Pacific Hwy. West north from Monmouth, Polk County; by St. Hwy. Comm.

\$267,213—**T. C. Wildish**, Eugene—Award for 2.6 mi. of grading and paving and a 63-ft. reinf. conc. bridge, Prairie Rd.-Eugene unit, Junction City-Eugene section, Pacific Hwy. north from Eugene, Lane County; by St. Hwy. Comm.

\$1,140,511—**Porter W. Yett**, 6500 N.E. Ainsworth St., Portland—Award for 15.4 mi. of grading and paving, Anlauf-Rice Hill unit and Rice Hill section of Pacific Hwy., vicinity of Yoncalla, Douglas County; by St. Hwy. Comm.

Utah

\$115,865—**J. M. Sumsion & Sons**, 389 E. 1st So., Springville—Award for 16 mi. of grading and draining and 2 gravel stockpiles, junction of U. S. 160 and St. 128 to Castleton Junction, Grand County; by St. Rd. Comm.

Washington

\$298,749—**Anderson Bridge Construction Co. and Roy T. Early Co.**, 4130 So. Adams, Tacoma—Award for Union Slough bridge, P.S.H. No. 1, Snohomish County; by St. Hwy. Comm.

\$234,540—**Cherf Bros. and Sandkay Construction Co.**, Ephrata—Low bid for Wind River fishway, Skamania County; by St. Dept. of Fisheries.

\$497,000—**Cisco Construction Co.**, Portland—Low bid for 3 mi. of 230-kv. transmission line betw. substations, incl. 2 new substations, in Hanford area; by AEC.

\$199,100—**D. & H. Construction Co.**, 2131 Fulton Ave., Sacramento, Calif.—Low bid for 4 mi. of earth lining, 4th section of West Canal; by USBR.

\$169,860—**N. Fiorito Co.**, 844 W. 48th St., Seattle—Award for Kincaid St. overcrossing in Mt. Vernon, P.S.H. No. 1, Skagit County; by St. Hwy. Comm.

\$382,960—**General Construction Co.**, 3840 Iowa Ave., Seattle—Award for rebuilding Pier No. 1, Everett; by Port of Everett.

\$276,495—**Gibson & Roberts**, Yardley—Award for grading and a 0.1 mi. tunnel, Heart O' the Hills hwy. project, 1-C portion, Clallam County; by BPR.

\$3,419,355—**Gunther & Shirley Co.**, 714 W. Olympic Blvd., Los Angeles, and **E. V. Lane Corp.**, Palo Alto, Calif.—Low bid for installation of powerhouse equipment, Chief Joseph Dam; by C. of E.

\$580,856—**Sather & Sons**, 1410 N. Howe, Yardley—Award for 4.6 mi. of approaches to Columbia River bridge at Pasco, Franklin County; by St. Hwy. Comm.

\$194,720—**L. D. Shilling Co.**, Moses Lake—Low bid for repairing 1,000-ft. section of feeder canal at Coulee Dam; by USBR.

Wyoming

\$126,779—**England & Roth Construction Co.**, 909 St. Francis St., Rapid City, So. Dak.—Award for 4.3 mi. of grading, draining, surf., and 3 treated timber bridges, Upton-Haycreek rd., Weston County; by St. Hwy. Dept.

\$345,573—**Jones-Hinckley & Jones, Inc.**, Box 856, Powell—Award for grading, 1 culvert, gravel base course, and base course stabilization, 6.5 mi. of Laramie-Ft. Collins rd. betw. Tie Siding and Colo. St. line, Albany County; by St. Hwy. Dept.

\$188,071—**Knisely-Moore Co.**, Box 77, Douglas—Award for 7.6 mi. of grading, pipe arch and 1 treated timber bridge, etc., Wilson-Moose rd., Teton County; by St. Hwy. Dept.

\$108,431—**J. A. McPherson & Co.**, Laramie—Award for 6.2 mi. of grading, rd.-mixed surf., gravel seal-coat, Kemmerer-Evanston rd., and crushing and stockpiling crushed gravel surf., Uinta County; by St. Hwy. Dept.

\$119,641—**Read Construction Co.**, 706 W. 19th St., Cheyenne—Award for 5.4 mi. of grading, surf., and oil treatment, Westvaro connection rd., Sweetwater County; by St. Hwy. Dept.

MORE SUPERVISORS

Manfred (Swede) Hultman is general superintendent for Engineers, Limited, on the Eastman Kodak Co. plant erection in Palo Alto, Calif., contract cost of which is \$1,750,000. He is assisted by **Frank E. Zoelern**. Project manager is **Wilson A. Grimes, Jr.** Other key men at the site are **Fred H. Peterson**, carpenter foreman, **Theodore Mitchell**, labor foreman, and **Leslie E. Carlson**, accountant. Precast and structural concrete work is subcontracted to G. E. Cardarelli who has **Fred Simonetta** acting as superintendent. Subcontractor for the electrical work is Farrow Electric Construction Co., with **Jack Kilburn** in the superintendent spot.

G. D. Spencer is superintending the building of a railroad overcrossing on State Highway 1 near Maytown, Wash., contract for which was recently awarded to Lockyear & White, Inc., at a cost of \$237,232.

Neal Lange, superintendent for Vinnell Co., Inc., is supervising the structural steel work on the new \$50,000,000 Anaconda Aluminum Co. plant at Columbia Falls, Mont. General foreman is **Pete Frandsen**, and **LaMarr Beal** is office manager.

M. L. Boyd is project superintendent on the construction of 166 mi. of 30-in. pipeline extending from Belen, New Mex., to the Arizona state line. **Chuck Siewert** is assistant superintendent on the section and is also acting as purchasing agent for R. H. Fulton & Co., the contractor. The pipeline will carry gas from Texas and Lea County, New Mex., across New Mexico and hook up with a line already carrying natural gas to the West Coast.

W. H. (Bill) Ryan is superintendent on Paul C. Helmick's \$446,660 job of clearing the Columbia River to Halford section of the Chief Joseph-Snohomish transmission line in Washington.

Business Manager: **Luther P. Vrettos**, 609 Mission St., San Francisco, Calif.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)

Arthur F. King, 609 Mission St., San Francisco, Calif.

Louise B. King, 609 Mission St., San Francisco, Calif.

M. K. Lyons, 609 Mission St., San Francisco, Calif.

M. K. Vogel, 609 Mission St., San Francisco, Calif.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

L. P. VRETTOS
(Signature of business manager)

Sworn to and subscribed before me this 24th day of September, 1953.

(Seal) (Signed) **RUTH POWELL POOL**
(My commission expires Sept. 11, 1954)

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF WESTERN CONSTRUCTION, PUBLISHED MONTHLY AT SAN FRANCISCO, CALIFORNIA, FOR OCTOBER 1, 1953.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher: **James I. Ballard**, 609 Mission St., San Francisco, Calif.

Editor: **Ralph W. Whitaker, Jr.**, 609 Mission St., San Francisco, Calif.

Managing Editor: **John J. Timmer, Jr.**, 609 Mission St., San Francisco, Calif.

IMPROVED

U.S. Highway Guard Rail and Supporting Post

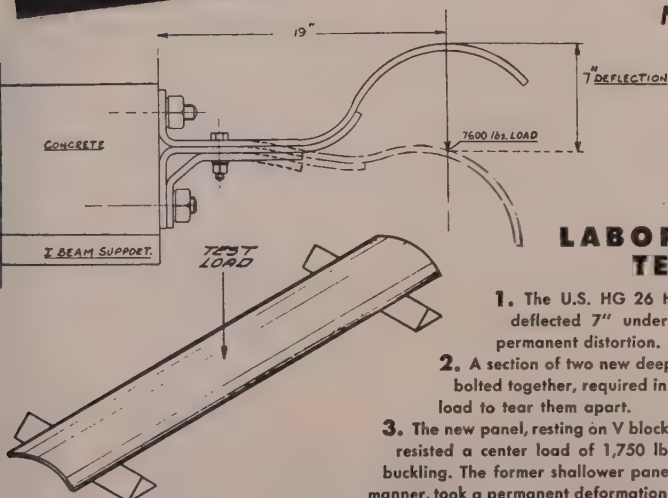
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LABORATORY TESTS

1. The U.S. HG 26 Highway Guard Post deflected 7" under 7,600 lbs. without permanent distortion.
2. A section of two new deep arch design panels, bolted together, required in excess of 90,000 lbs. load to tear them apart.
3. The new panel, resting on V blocks spaced 10 ft. apart, resisted a center load of 1,750 lbs. before permanent buckling. The former shallower panel, tested in the same manner, took a permanent deformation at only 795 lbs. load.



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UNIT BID PRICES

Selected abstracts for Western projects

Dam

Monticello Dam

California—Solano Project—USBR. Peter Kiewit Sons' Co. and Parish Bros., Benicia, were awarded a contract for construction of Monticello Dam on the basis of a joint low bid of \$7,628,991 submitted before the Bureau of Reclamation. The dam will be an arch-type concrete structure located on Putah Creek at the junction of Yolo, Solano, and Napa counties. An account of specifications for this project was presented in WESTERN CONSTRUCTION, August, pp. 82-83. Unit bids submitted were as follows:

(1) Peter Kiewit Sons' Co. and Parish Bros.	\$7,628,991				
(2) Guy F. Atkinson Co.	8,417,560				
(3) W. E. Kier Construction Co., A. Teichert & Sons, Inc., and John C. Gist Co.	8,658,724				
(4) Morrison-Knudsen Co., Inc., and Stolte, Inc. (exclud. items 95 to 99)	8,765,433				
— General-Shea-Pacific (exclud. items 91 to 94)	8,763,844				
— The Arundel Corp. and L. E. Dixon Co.	8,770,000				
— J. A. Jones Construction Co.	9,066,961				
— Winston Bros. Co. and Al. Johnson Construction Co.	9,237,748				
— Walsh Construction Co., B. Perini & Sons, and Henry J. Kaiser Co.	9,312,357				
— Utah Construction Co.	9,497,217				
— Wixson & Crowe, Inc., and J. C. Maguire & Co.	10,143,710				
— Foley-Donovan-Lytle	10,383,806				
(5) Engineer's estimate (excluding items 95 to 99)	10,469,888				
(excluding items 91 to 94)	8,158,147				
	8,155,667				
	(1)	(2)	(3)	(4)	(5)
Lump sum, diversion and care of stream during constr. and unwatering foundations	\$250,000	\$366,500	\$250,000	\$327,220	\$400,000
15,000 cu. yd. excav., com., in open-cut at dam site	2.60	5.50	8.25	1.17	2.00
37,000 cu. yd. excav., rock, in open-cut at dam site, first 37,000 cubic yd.	8.70	5.50	8.25	3.95	5.00
37,000 cu. yd. excav., rock, in open-cut at dam site, over 37,000 cubic yd.	2.60	5.50	8.25	3.95	4.00
23,700 cu. yd. excav., all classes, in spillway tunnel and shaft	11.00	10.00	15.00	14.52	22.00
100,000 lb. furn. and placing perm. struct'l-steel ribs, steel tunnel-liner plates, and steel lagging	.11	.16	.25	.21	.20
400 cu. yd. rock fill	2.60	4.00	3.00	1.60	1.00
3,000 lin. ft. drilling drainage holes in stage betw. depths of 0 ft. and 25 ft.	3.30	4.75	5.00	3.91	4.50
2,850 lin. ft. drilling drainage holes in stage betw. depths of 25 ft. and 50 ft.	3.30	4.75	5.00	3.91	5.00
1,650 lin. ft. drilling drainage holes in stage betw. depths of 50 ft. and 75 ft.	3.80	5.25	5.00	4.44	5.50
300 lin. ft. drilling drainage holes in stage betw. depths of 75 ft. and 100 ft.	4.40	5.25	5.00	4.97	6.00
150 lin. ft. furn. 18-in. diam. sewer pipe & constr. drains with uncemented jts.	8.50	7.50	10.00	6.48	5.50
25,000 lin. ft. drilling grout holes in stage betw. depths of 0 ft. and 30 ft.	1.90	2.25	2.20	2.29	2.00
8,300 lin. ft. drilling grout holes in stage betw. depths of 30 ft. and 60 ft.	1.90	2.25	2.20	2.29	2.25
4,700 lin. ft. drilling grout holes in stage betw. depths of 60 ft. and 110 ft.	1.90	2.60	2.50	2.32	2.50
2,100 lin. ft. drilling grout holes in stage betw. depths of 110 ft. and 160 ft.	2.00	2.60	2.50	2.48	2.75
600 lin. ft. drilling grout holes in stage betw. depths of 160 ft. and 210 ft.	2.00	2.60	2.50	2.48	3.00
150 lin. ft. core drilling NX holes in stage betw. depths of 0 ft. and 50 ft.	4.40	6.75	7.00	5.07	8.00
150 lin. ft. core drilling NX holes in stage betw. depths of 50 ft. and 100 ft.	5.50	6.75	7.00	6.14	9.00
100 lin. ft. core drilling 5 and 1/2-in. diam. holes not more than 30 ft. deep	13.00	15.00	15.00	15.23	15.00
47,000 lb. furn. and placing metal pipe and fittings for foundation grouting and drainage	.32	.60	1.30	1.16	.70
830 hook-up to grout holes	5.50	10.00	5.00	6.34	10.00
40,600 sack pressure grouting founda. and tunnels	2.10	2.75	2.20	2.22	2.25
22,700 lb. placing metal tubing and fittings for grouting contraction joints	.41	.75	.70	.91	.50
70 hook-up to contraction joint grouting lifts	27.50	100.00	40.00	28.50	20.00
2,400 sack pressure grouting contraction joints and cooling systems	2.25	4.00	5.00	2.49	3.00
250 bbl. furn. and handling spec. cem. for grouting contraction joints	5.00	4.25	5.00	4.55	10.00
800 lin. ft. drilling holes for anchor bars and grouting bars in place	1.00	2.00	2.00	2.05	2.50
650 sq. yd. special finishing of concrete surfaces	7.70	11.00	10.00	16.01	18.00
500,000 lb. furn. and placing reinf. bars	.10	.095	.10	.1054	.13
173,000 bbl. furn. and handling cem. for dam and appurtenant works	4.00	3.75	4.00	4.34	4.00
13,000 ton furn. and handling pozzolan	21.50	21.00	22.00	22.96	20.00
130,000 cu. yd. concrete in dam, first 130,000 cu. yd.	16.00	19.75	16.20	18.65	19.00
130,000 cu. yd. concrete in dam over 130,000 cu. yd.	9.80	12.50	12.25	12.75	10.00
1,000 cu. yd. concrete in outlet works	16.00	18.50	24.00	25.77	35.00
430 cu. yd. concrete in trashrack struts	144.00	110.00	200.00	105.83	80.00
415 cu. yd. concrete in gate-hoist struct.	68.00	60.00	75.00	73.80	70.00
1,200 cu. yd. conc. in scdwls., curbs, and parapets	70.00	90.00	100.00	84.48	60.00
60 cu. yd. concrete in blockouts	122.00	130.00	200.00	159.20	120.00
1,750 cu. yd. conc. in spillway crest struct.	27.50	40.00	34.00	25.77	60.00
7,120 cu. yd. conc. in spillway tun. and shaft lining	29.00	50.00	50.00	38.58	35.00
230 cu. yd. conc. in spillway tunnel portal	22.00	35.00	40.00	36.44	50.00

Continued on next page

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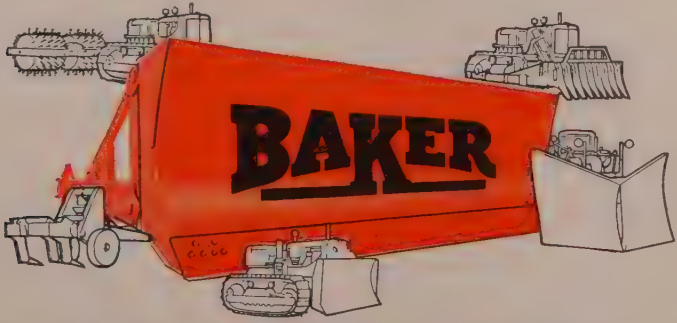
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Oregon, Ltd.
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- Farm & Industrial Equipment Co.
Eugene, Oregon
North Bend, Oregon
Roseburg, Oregon

- Wood Tractor Company
Portland, Oregon

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- Gate Equipment Company, Inc.
Salt Lake City, Utah

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- A. H. Cox & Company
Seattle, Washington
Wenatchee, Washington

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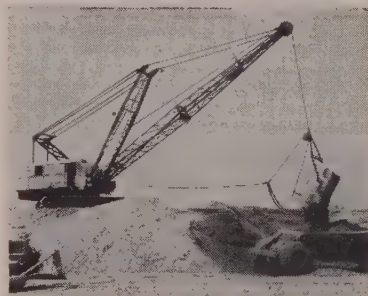
UNIT BID PRICES . . . CONTINUED

	(1)	(2)	(3)	(4)	(5)
315 cu. yd. conc. in spillway channel lining	21.00	35.00	34.00	31.11	40.00
254,800 cu. yd. cooling concrete	1.02	.22	.40	1.71	.35
190,500 lb. placing metal tubing and fittings for conc. cooling systems	.15	.50	.40	.21	.25
3,225 lin. ft. constructing asphalt seals	7.80	7.50	9.00	5.34	10.00
9,850 lin. ft. furn. and placing metal sealing strips	.92	3.00	3.00	1.60	2.20
1,820 lin. ft. furn. and placing metal grout groove covers	.80	1.10	2.00	1.07	1.50
45 recess painting lighting recesses	14.00	10.00	5.00	2.54	10.00
60 lin. ft. drilling 10-in. diam. core specimens in concrete	31.00	32.00	40.00	29.19	25.00
4,000 lb. installing bulkhd. gate frame anchor bolts	.40	.45	.70	.37	.30
43,000 lb. installing bulkhead gate frames	.09	.17	.20	.11	.20
20,000 lb. installing bulkhead gate	.05	.07	.12	.07	.10
66,000 lb. installing hollow jet valves	.04	.05	.08	.12	.08
60,000 lb. installing guard valves and adapters	.05	.05	.08	.12	.08
90,000 lb. installing 90-in. outlet pipes	.09	.19	.20	.16	.12
331,300 lb. installing trashracks	.07	.07	.08	.07	.06
2,600 lb. installing track rails	.04	.15	.20	.13	.08
24,000 lb. erect. structural-steel for outlet works.....	.06	.10	.15	.16	.10
15,000 lb. installing gantry crane	.04	.11	.25	.13	.10
7,680 lb. installing metal cover plates and gratings	.05	.16	.20	.13	.15
600 lb. installing embedded metal frames, anchors, and bearing plates	.26	.60	.40	.17	.30
24,000 lb. installing bell-mouths	.04	.06	.16	.16	.15
25,000 lb. installing metal stairways, ladders and handrails	.26	.38	.30	.32	.25
290 lin. ft. furn. and installing chain-link fence.....	2.80	1.70	2.00	2.15	4.00
1,700 lb. installing manhole frames and covers	.15	.40	.35	.15	.20
20,400 lb. installing metal pipe, fittings, and valves	.24	.40	.30	.27	.30
2,000 lin. ft. furn. and install. elect. metal conduit 3/4- and 1-in. in diam.	1.30	2.10	2.00	1.40	1.20
1,000 lin. ft. furn. and install. elect. metal conduit 1 1/2- and 2-in. in diam.	2.00	3.25	2.00	2.27	2.40
200 lin. ft. furn. and install. elect. metal conduit 4 1/2-in. in diam.	5.00	9.00	7.00	5.79	6.00
1,500 lb. furn. and install. elect. conductors and grounding materials	2.20	1.70	4.00	2.10	2.00
500 lb. installing elect. apparatus	2.20	1.50	.75	1.86	1.00
14,000 lin. ft. installing elect. cables for resistance thermometers and strain meters	.63	.50	.30	.37	.25
Relocation of State Highway No. 28					
26 acre clearing right-of-way	470.00	400.00	350.00	367.50	300.00
371,000 cu. yd. excav. all classes, for roadway	1.53	.93	1.40	1.25	.75
11,000 thou. gal. watering	2.65	1.90	2.50	1.84	3.00
2,600 roller hr. rolling embankments	7.50	8.00	7.50	12.60	8.00
1,900,000 sta. cu. yd. overhaul of excav. for roadway	.01	.005	.01	.011	.01
3,000 cu. yd. excav. all cl., for ditches and channels	3.10	2.10	1.50	1.42	2.00
6,300 cu. yd. excav. com., for piers and abutments of Putah Creek bridge	3.00	2.25	4.00	4.00	2.50
250 cu. yd. excav. rock, for piers and abutments of Putah Creek bridge	12.00	6.50	10.00	8.50	5.00
4,500 cu. yd. excav. all classes, for structs.	3.75	2.00	4.00	6.20	3.50
10,000 cu. yd. backfill	1.00	.65	1.00	1.50	.60
6,800 cu. yd. compacting backfill	3.00	2.20	4.00	2.80	2.50
35 cu. yd. gravel blanket under roadway riprap	7.00	9.00	5.00	5.60	6.00
70 cu. yd. riprap for roadway	3.50	8.50	5.00	10.20	6.00
1,300 sq. yd. dry-rock paving	12.00	11.00	6.00	7.35	7.00
1,000 cu. yd. conc. in abutments and piers of Putah Creek bridge	40.00	42.00	44.00	42.30	60.00
170,000 lb. furn. and placing reinf. bars in abutments and piers of Putah Creek bridge	.10	.09	.10	.097	.14
2,000 bbl. furn. and handling cement for highway structs. except super-struct. for Putah Creek bridge	4.40	4.50	5.00	5.30	5.25
880 cu. yd. conc. in bridge deck, Design No. 1 of Putah Creek bridge	55.00	.....	75.15	95.00	.....
220,000 lb. furn. and placing reinf. bars in bridge deck, Design No. 1 of Putah Creek bridge	.09	.....	.0935	.14	.....
1,300 bbl. furn. and handling cem. for bridge deck, Design No. 1 of Putah Creek bridge	4.50	.....	5.30	5.00	.....
21,000 lb. furn. and installing miscel. metalwork, Design No. 1 of Putah Creek bridge	.45	.....	.40	.50	.....
385 cu. yd. conc. in bridge slab, Design No. 2 of Putah Creek bridge	65.60	.....	80.00	72.90	90.00
88,000 lb. furn. and placing reinf. bars in bridge slab, Design No. 2 of Putah Creek bridge	.11	.....	.10	.1034	.14
1,100 bbl. furn. and handling cem. for bridge slab, and precast prestressed conc. beams, Design No. 2 of Putah Creek bridge	4.40	.....	5.00	5.30	4.50
32 beam constr. and erecting precast prestressed concrete beams, Design No. 2 of Putah Creek bridge	\$1,300	.....	\$1,700	\$1,469	\$2,000
26,000 lb. furn. and installing miscel. metalwork, Design No. 2 of Putah Creek bridge	.50	.....	.50	.40	.50
270 lin. ft. placing rubber water stops in joints.....	1.00	2.75	2.50	.80	1.50
150 sq. ft. furn. and placing 1/2-in. elastic filler matl. in joints	1.30	3.25	2.50	2.80	1.60
80 sq. ft. furn. and placing 1-in. elastic filler matl. in joints	2.30	4.50	3.00	4.50	2.00
1,000 lin. ft. furn. and installing metal bridge railing for Putah Creek bridge	8.75	8.50	9.00	8.00	4.50
110 cu. yd. conc. in footings and abutments of temporary bridge	52.00	40.00	44.00	37.90	50.00
10,000 lb. furn. and placing reinf. bars in footings and abutments of temporary bridge	.11	.10	.10	.105	.18
100 M.b.m. furn. and erect. timber in temp. bridge	310.00	200.00	400.00	260.00	300.00
1,000 lin. ft. furn. and erecting round timber in temp. bridge	2.35	2.20	5.00	3.40	3.00
450 lin. ft. furn. and install. metal bridge railings for temp. bridge	4.30	4.20	4.00	3.60	4.50
140 lin. ft. furn. and laying 24-in. diam., std.-str. reinforced-conc. pipe	5.80	6.50	8.00	5.40	7.00

	(1)	(2)	(3)	(4)	(5)
445 lin. ft. furn. and laying 30-in. diam., ex-str. reinforced-conc. pipe	8.60	11.00	12.00	10.85	10.40
100 lin. ft. furn. and laying 8-in. diam., No. 16 gauge corrugated-metal pipe	2.65	2.70	2.00	2.80	2.50
768 lin. ft. furn. and laying 18-in. diam., No. 16 gauge corrugated-metal pipe	4.00	4.40	5.00	4.50	4.50
66 lin. ft. furn. and laying 18-in. diam., No. 16 gauge bitum.-coated, paved-invert, corrugated-metal pipe	5.50	6.00	6.00	6.80	6.00
130 lin. ft. furn. and laying 12-in. diam., No. 16 gauge corrugated-metal pipe	3.30	3.70	3.00	3.80	3.00
110 lin. ft. furn. and laying 24-in. diam., No. 14 gauge corrugated-metal pipe	6.00	6.40	6.00	7.00	6.50
78 lin. ft. furn. and laying 30-in. diam., No. 14 gauge corrugated-metal pipe	7.00	8.00	7.00	9.00	8.00
50 lin. ft. furn. and laying 48-in. diam., No. 12 gauge corrugated-metal pipe	13.00	14.00	14.00	17.00	14.00
118 lin. ft. furn. and laying 48-in. diam., No. 12 gauge corrugated-metal pipe	16.00	16.50	14.00	18.00	16.00
314 lin. ft. furn. and erecting 120-in. diam. No. 5 gauge top and side plates, No. 1 gauge bottom plates, multiple-plate corrugated-metal pipe	100.00	85.00	110.00	108.50	100.00
98 lin. ft. furn. and erecting 150-in. diam., No. 8 gauge multiple-plate corr.-metal pipe	105.00	90.00	120.00	118.50	100.00
1 assembly furn. and placing spillway assembly	33.00	35.00	30.00	43.00	50.00
340 cu. yd. concrete in retaining wall	58.00	55.00	70.00	60.00	75.00
145 cu. yd. conc. in culvert headwalls and inlets	65.00	78.00	90.00	92.00	60.00
1,500 lb. furn. and installing metalwork for inlets	40	55	50	85	35
53 monument manuf. and setting conc. monum.	10.00	8.50	8.00	11.30	10.00
55,000 lb. furn. and placing reinf. bars for highway structs. except bridges	125	11	10	12	18
1.8 mi. furn. and constr. right-of-way fences	\$2,850	\$2,700	\$2,200	\$3,277	\$1,300
3,300 lin. ft. furn. and erect. beam-type guard rail	3.90	3.30	4.00	3.00	3.50
70 installation furn. and install. timber culvert markers and guide posts	11.00	7.50	8.00	6.00	6.00
1 M.b.m. furn. and const. timb. risers for inlets	215.00	220.00	400.00	260.00	300.00
30,000 ton untreated rock base	2.00	1.80	2.60	2.15	2.50
60 ton liquid asphalt MC-2	40.00	28.00	40.00	41.50	40.00
50 ton liquid asphalt ES-4	40.00	27.00	40.00	41.50	40.00
1,500 ton cover coat material	6.50	8.50	8.00	7.90	3.50
20 ton plant-sized surfacing for berms, ditches, and spillways	23.00	22.00	20.00	40.00	12.00
Lump sum, removing and salvaging temporary bridge					
1,200 lin. ft. removing and salvaging beam type guard rail	.60	1.40	1.00	.40	1.00
78 lin. ft. removing and salvaging 30-in. diam. corrugated-metal pipe culverts	1.00	3.20	2.00	1.10	2.50
50 lin. ft. removing and salvaging 42-in. diam. corrugated-metal pipe culverts	1.30	5.50	2.00	1.10	3.50
118 lin. ft. removing and salvaging 48-in. diam. corrugated-metal pipe culverts	1.50	7.50	3.00	1.10	4.00
98 lin. ft. removing and salvaging 150-in. diam. multiple-plate corr.-metal pipe culverts	12.50	16.00	10.00	19.20	25.00
5,500 cu. yd. excav., com., for removal of culverts	3.10	.65	.50	2.30	2.00
Lump sum, removing and salvaging corrugated-metal spillway assembly	15.00	25.00	20.00	11.30	40.00

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Streets and Highways

3.6 mi. of asphaltic concrete paving

Washington—Lewis County—State. Pacific Sand & Gravel Co., Centralia, won an award from the State Highway Commission on the basis of a low bid of \$409,613 for 3.6 mi. of asphaltic concrete paving on cement-treated base on P.S.H. No. 1 from National Ave. to Borst Park. Work includes furnishing and placing 52,510 tons of special rock base and 12,600 tons of special ballast. Unit prices were as follows:

(1) Pacific Sand & Gravel Co.	\$409,613	(4) Peter Kiewit Sons' Co.	\$494,323
(2) N. Fiorito Co.	417,118	(5) D-H Paving Co.	540,390
(3) J. D. Shotwell Co.	457,554	— Porter W. Yett	640,647

	(1)	(2)	(3)	(4)	(5)
12,690 cu. yd. common excav., incl. haul	.70	1.00	.30	.50	.75
30 cu. yd. common trench excav., incl. haul	2.00	3.00	2.00	3.00	4.00
1,160 cu. yd. structure excav.	2.50	2.00	4.00	2.00	3.50
33 day smooth-wheeled power roller	55.00	50.00	60.00	65.00	55.00
3 day tamping roller	55.00	75.00	100.00	85.00	75.00
20 day variable load compactor	150.00	98.00	150.00	125.00	150.00
30 day pneumatic-tired roller	55.00	55.00	60.00	55.00	55.00
19 day mechanical tamper	55.00	45.00	60.00	45.00	50.00
334.0 sta. (100-ft.) finishing roadway	10.00	15.00	7.50	13.00	10.00
1,750 M. gal. water	3.00	2.50	2.00	2.00	2.50
15 cu. yd. gravel backfill for foundations	5.00	10.00	3.00	5.00	7.50
840 cu. yd. gravel backfill for drains	4.00	4.50	2.50	5.00	5.00
35,500 ton selected roadway borrow	.85	.90	1.35	1.45	1.40
10,270 ton furn. and pl. cr. stone surf. top course	1.95	1.55	1.65	2.35	2.50
52,510 ton furn. and pl. special rock base	1.20	1.45	1.45	2.00	1.85
12,600 ton furn. and pl. special ballast	1.10	1.38	1.50	1.50	2.35

TYPE I-1 ASPHALTIC CONCRETE PAVEMENT

11,230 ton Class C wearing course	5.90	5.50	6.40	6.65	7.25
11,230 ton Class L leveling course	5.90	5.50	6.25	6.65	7.25

CEMENT TREATED BASE

11,330 sq. yd. mix. and pl. cement treat. base 4-in. section	.20	.14	.15	.08	.20
10,610 sq. yd. mix. and pl. cement treat. base 6-in. section	.20	.14	.20	.13	.25
10,240 barrels portland cement	5.00	5.50	6.00	5.90	6.00
180 ton emulsified asphalt RS-1 curing seal	44.00	45.00	47.50	45.00	60.00

OTHER ITEMS

1,196 lin. ft. asphaltic conc. gutter in place in Median	.55	.75	.50	.60	1.00
112 lin. ft. asphaltic concrete traffic bars	2.00	1.00	2.00	1.20	1.50
804 lin. ft. pl. conc. or V.C. drain pipe 4-in. diam.	.80	.60	1.00	.70	1.00
3,004 lin. ft. pl. conc. or V.C. drain pipe 6-in. diam.	1.00	.75	1.10	.90	1.00
828 lin. ft. std. reinf. conc. culv. pipe 12-in. diam.	2.40	2.25	2.00	2.50	2.00

Continued on next page

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UNIT BID PRICES... CONTINUED

	(1)	(2)	(3)	(4)	(5)
14 only catch basins	100.00	100.00	100.00	110.00	100.00
1,914 lin. ft. beam guard rail	3.00	3.50	3.50	3.40	3.50
1,527 lin. ft. temporary beam guard rail	2.20	3.25	2.00	2.90	3.00
313 only reinf. conc. spot posts	11.20	12.50	10.00	12.00	12.00
70 cu. yd. hand placed riprap	10.00	20.00	25.00	20.00	18.00
4,040 cu. yd. top soil incl. haul	2.00	1.75	2.50	1.40	2.50
2,330 sq. yd. removing cement concrete pavement	1.00	.65	.50	.50	.80
500 sq. yd. removing asphaltic conc. pavement	1.00	.50	.20	.50	.50
318 lin. ft. removing temporary beam guard rail	1.00	1.00	1.00	.90	1.00
115 sq. yd. removing cement concrete sidewalk	1.00	1.00	1.00	1.00	.80
250 lin. ft. removing cement concrete curb	1.00	.50	.50	1.00	1.00
318 lin. ft. resetting temporary beam guard rail	1.20	1.50	2.50	.90	1.50
1,498 lin. ft. gal. conduit pipe 1-in. diam.	.90	1.00	.75	.75	1.00
368 lin. ft. gal. conduit pipe 1½-in. diam.	1.05	1.50	1.00	.90	1.25

Bridge and Grade Separation

Reinforced concrete girder bridge

California—Sonoma County—State. Erickson-Phillips & Weisberg, Oakland, was awarded a contract on the basis of a low bid of \$850,063 submitted before the Division of Highways for construction of a reinforced concrete girder bridge crossing Petaluma Creek and the Northwestern Pacific Railroad Co. tracks. Unit bids were as follows:

(1) Erickson-Phillips & Weisberg	\$ 850,063
(2) Charles MacClosky Co.	932,436
(3) Tumblin Co.	939,574
(4) Williams & Burrows, Inc., and Carl N. Swenson Co., Inc.	954,352
(5) Chas. L. Harney, Inc.	954,698
(6) Dan Caputo	960,524
— Fredrickson & Watson Construction Co. and M & K Corp.	977,735
— Lew Jones Construction Co.	995,245
— Stolte, Inc.	1,004,938
— Ben C. Gerwick, Inc. and Peter Kiewit Sons' Co.	1,020,555
— Rothschild, Raffin & Weirick and Pacific Bridge Co.	1,036,356
— The Duncanson-Harrelson Co.	1,043,822

	(1)	(2)	(3)	(4)	(5)	(6)
4,500 cu. yd. clearing and grubbing	\$10,000	\$46,000	\$10,441	\$2,000	\$1,600	500.00
1,535 cu. yd. roadway excav.	1.10	1.00	1.00	1.10	.60	1.10
3,480 cu. yd. struct. excav., Type "A"	7.00	12.00	37.00	13.60	18.00	28.00
55 cu. yd. struct. excav., Type "B"	3.00	12.00	2.00	2.70	4.00	3.00
Ditch and channel excav.	5.00	4.00	1.00	1.00	3.00	4.00
170 M. gal. dev. wat. sup. & furn. wat. equip.	\$10,000	\$2,000	\$2,000	500.00	\$7,000	500.00
1,410 cu. yd. apply water	1.00	5.00	1.00	3.00	2.40	3.00
7,630 cu. yd. Class "A" P.C.C. (footing block)	20.00	25.00	20.00	55.00	28.00	25.00
3,744 lin. ft. Class "A" P.C.C. (structure)	55.00	64.00	66.00	64.00	67.00	69.00
255 lin. ft. conc. railing	9.00	6.00	6.00	6.00	6.00	6.50
21,000 lb. rubber waterstops	3.00	3.00	3.00	4.00	3.00	3.00
7,054 lin. ft. misc. steel	.50	.30	.40	.85	.44	.50
5,615 lin. ft. furn. steel piling	6.00	5.50	6.00	6.50	7.00	6.00
307 ea. furn. conc. piling	3.25	4.00	4.00	3.60	4.00	3.50
50 ea. driving piles	135.00	100.00	100.00	120.00	130.00	132.00
40 lin. ft. steel pile splices	30.00	40.00	35.00	39.00	40.00	35.00
1,854,000 lb. 8-in. C.M.P. down drains (16 ga.)	3.00	5.00	2.00	8.00	10.00	3.00
Bar reinforcing steel	.09	.08	.09	.0875	.09	.09
350 sq. ft. timber feeders and dolphins	\$35,000	\$20,000	\$28,000	\$38,161	\$34,000	\$29,785
Remov. traffic stripes	.50	.60	.20	.40	.31	.25
Navigation lighting equip.	\$5,000	\$2,900	\$3,000	\$3,160	\$3,000	\$2,000

Miscellaneous

Rental rates for various types of equipment

California—San Luis Obispo County—State. The following is a resumé of equipment rental bids received by the State Division of Highways for various pieces of equipment. Description of the equipment and the rates offered were as follows:

One or more self-propelled tamping-leveling-finishing machines as the Barber-Greene, or equal, to be fully fueled, maintained and with operators.

Bid was awarded to Valley Paving & Construction Co., Inc., Pismo Beach, California.

		RENTAL RATE PER HOUR							
		Location "A"		Location "B"		Location "C"			
		North	South	North	South	North	South		
		Cos.	Cos.	Cos.	Cos.	Cos.	Cos.		
BIDDER	Make	Year							
Valley Paving & Constr. Co., Inc.									
P. O. Box 6	Adnum	1950	\$11.75		\$10.50	\$10.00		\$11.00	\$11.00
Pismo Beach, Calif.									
A. J. Diani Construction Co.									
P. O. Box 636	Barber-Greene	1953	13.95	13.75	13.95	13.75	13.95	13.75	10.83
Santa Maria, Calif.									
Edward Keeble									
Rt. 4, Box 64	Jaeger	1950	15.00	15.00	15.00	15.00	15.00	15.00	10.00
San Jose, Calif.									
Granite Construction Co.									
P. O. Box 900	Adnum	1952			15.00	15.00			12.50
Watsonville, Calif.									

One (1) pneumatic tired, trailer type roller, designed for use with pneumatic tired tractor equipment, to have not less than eight rigidly mounted tires and weighing not less than eight thousand (8,000) pounds when loaded.

Bid was awarded to R. McGray, Santa Maria, California.

Bidder	Make	Year	Rental Rate Per Day	Per Mo.	*Transportation Lump Sum Bid
R. McGray	Madsen	1948	.....	\$ 90.00	\$30.00
P. O. Box 348, Santa Maria, Calif.					
Valley Paving & Constr. Co.	Madsen	1940	\$10.50	\$200.00	\$90.00
P. O. Box 6, Pismo Beach, Calif.					
Madonna Constr. Co.	Bros	1951	\$40.00	\$550.00	\$100.00
399, Freeway, San Luis Obispo, Calif.					

*From Vendor's Headquarters to the Division of Highways Maintenance Yard, Cambria, and return upon completion of work.

Seven (7) each 5½ to 7 cubic yards approximate capacity dump trucks with power hoists and steel bodies to be completely operated, fueled and maintained.

Service agreement was awarded to Mel H. Corippo, Paso Robles, California.

Bidder	Equipment	Make	Year	*Rental Rate SLO Co.	Per Hour Mon Co.
Mel H. Corippo	Truck "A"	International	1952	\$6.10	\$6.56
1221 Park St.	Truck "B"	International	1952	6.10	6.56
Paso Robles, Calif.	Truck "C"	International	1950	6.10	6.56
	Truck "D"	Ford	1952	6.10	6.56
	Truck "E"	Ford	1952	6.10	6.56
	Truck "F"	Ford	1948	6.10	6.56
	Truck "G"	Ford	1948	6.10	6.56
Madonna Construction Co.	Truck "A"	Mack	1947	8.00	8.00
P. O. Box 910	Truck "B"	Mack	1947	8.00	8.00
San Luis Obispo, Calif.	Truck "C"	Mack	1947	8.00	8.00
	Truck "D"	Mack	1947	8.00	8.00
	Truck "E"	Mack	1947	8.00	8.00
	Truck "F"	Mack	1947	8.00	8.00
	Truck "G"	Mack	1947	8.00	8.00

*Includes dump truck completely fueled, maintained and with operator.

One (1) crawler type tractor, diesel propelled, with power rating as a D-8 Caterpillar, or equal, to be equipped with bulldozer blade and heavy duty rooster; to be fully operated, fueled and maintained.

Bid was awarded to Clarence Lambert, Santa Barbara, California.

Bidder	Make	Year	*Rental Rate Per Hour
Clarence Lambert			
120-A Romero Canyon Rd., Santa Barbara, Calif.	D-8 Caterpillar	1950	\$13.50
Baker & Pollock, 211 N. Olive St., Ventura, Calif.	D-8 Caterpillar	1946	14.95
	Rebuilt	1952	
C. W. Cloer, 903 S. Fairview Ave., Goleta, Calif.	International T.D. 24	1952	18.00
Wm. C. Smith, 525 Tulane St., Salinas, Calif.	D-8 Caterpillar	1947	18.25
	Model H LeTourneau Rooter		
Jerry W. Nunn, P. O. Box 68, Santa Maria, Calif.	D-8 Caterpillar	1949	22.00
Sanchez Bros., Santa Ynez, Calif.			No Bid
McNall Building Materials, Inc., P. O. Box 758, Santa Barbara, Calif.			No Bid

*Includes fully fueled and maintained equipment complete with operator and transportation of equipment from Vendor's headquarters to and from jobsite.

Construction and installation of drainage facilities

California—San Bernardino County—State. Lloyd R. Johnson, Rialto, submitted a low bid of \$46,259 before the Division of Highways for construction and installation of drainage facilities on Mt. Vernon Ave. between 4th and 7th Sts. in the City of San Bernardino. Unit bids submitted were as follows:

(1) Lloyd R. Johnson.....	\$46,259	(5) Norman I. Fadel.....	\$61,690				
(2) George Herz & Co.....	52,150	(6) Matich Bros.....	67,505				
(3) James E. Roberts.....	58,362	— E. C. Young.....	68,925				
(4) Hubbs Equipment Co.....	60,882						
		(1)	(2)	(3)	(4)	(5)	(6)
450 cu. yd. removing concrete	16.75	10.00	15.00	15.00	10.00	2.50	
3,150 cu. yd. structure excavation	2.50	2.95	2.00	3.00	1.80	5.45	
84 ton plant-mixed surfacing	11.00	15.00	10.00	9.00	10.00	10.00	
200 cu. yd. Class "B" portland cem. conc. (base)	16.00	16.00	18.00	30.00	25.00	18.00	
85 cu. yd. Class "A" portland cem. conc. (structs)	57.00	80.00	100.00	125.00	150.00	75.00	
124 lin. ft. 18-in. reinf. conc. pipe (Std. Str.)	8.00	6.15	8.00	4.75	10.00	7.00	
1,908 lin. ft. 36-in. reinf. conc. pipe (std. str.)	9.50	12.50	15.00	12.50	15.00	18.40	
9,500 lb. bar reinforcing steel	.15	.125	.15	.16	.15	.14	
1,350 lb. miscel. iron and steel	.50	.45	.50	.55	.70	.35	
2 ea. street manhole frames and covers	250.00	235.00	250.00	200.00	250.00	250.00	
4 ea. sidewalk manhole frames and covers	40.00	55.00	40.00	50.00	50.00	30.00	

Spillway repairs at Fresno Dam in Montana

Montana—Milk River Project—USBR. Long Construction Co., Billings, submitted a lone bid of \$156,772 for spillway repair work at Fresno Dam. Unit prices were as follows:

(1) Long Construction Co.	\$156,772	(2) Engineer's estimate	\$113,430
		(1)	(2)
400 lin. ft. sawing 2-in. deep groove in concrete		1.60	1.15
600 cu. yd. removal of existing concrete		44.00	30.00
1,340 cu. yd. excavation of foundation materials		16.00	7.00
600 gal. sprayed protective coating		.80	1.50
240 lin. ft. drilling holes for anchor bars and grouting bars in place		4.80	2.00
200 lin. ft. drilling holes for dowels and grouting dowels in place		4.00	2.50
1,300 bbl. furnishing and handling cement		6.40	6.00
106,000 lb. furnishing and placing reinforcement bars		.20	.18
870 cu. yd. concrete		60.00	50.00
1,050 cu. yd. graded sand and gravel blanket		16.00	7.00
650 lin. ft. furn. 6-in. diam. sewer pipe and constr. drains with uncem. joints		1.20	2.00
200 lin. ft. furn. 8-in. diam. sewer pipe and constr. drains with uncem. joints		1.60	2.50
240 lin. ft. furn. 10-in. diam. sewer pipe and constr. drains with uncem. joints		2.00	3.00
Lump sum, cleaning existing drainage system		800.00	\$1,000
Lump sum, filling contraction joints with mastic filler		160.00	500.00
5,200 lb. furnishing and installing steel H-beams		.80	.30

just nail 'em in...
pour your concrete

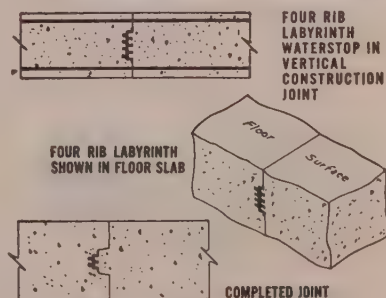


AND FORGET ABOUT SEEPAGE
WITH LABYRINTH
WATERSTOPS

Concrete shrinkage can't cause leakage between pours when you're protected by ribbed and grooved polyvinyl plastic Labyrinth Waterstops in the joints.

Economical? You bet . . . No special forms, no metal fins to bend or tear . . . no maintenance cost, AND . . .

INSTALLATION COST IS VIRTUALLY ZERO!



WATER SEALS, inc.

9 SOUTH CLINTON STREET
CHICAGO 6, ILLINOIS

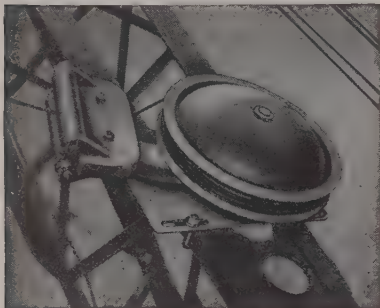
For Further Information and Sample—Clip the Coupon!
Patent applied for



WATER SEALS, INC.,
9 South Clinton St., Chicago 6, Illinois
Send full information and sample.

Name _____
Company _____
Address _____
City _____ Zone _____ State _____

BE MODERN AND UP TO DATE WITH
UNIFORM TENSION
at any pay-out



**WESTFALL CENTER-PULL
 AUTOMATIC TAGLINE
 AND MAGNET CONTROL REELS**

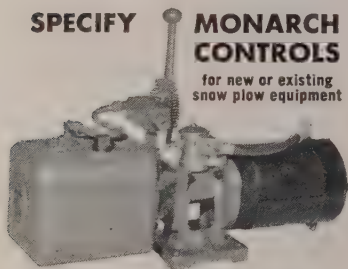
- FAIRLEAD ROLLERS** — Save needless line wear.
- MOVING PARTS** — Ball-bearing mounted.
- AMPLE PAY-OUT** — Big reserve for all jobs.
- SMALL, COMPACT** — No bulky projections.
- BETTER SIGHT** — Does not obstruct operator's vision.
- QUICK INSTALLATION** — 4 "J" bolts — No drilling.
- 5 SIZES** for any tagline requirement.

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 HYDRAULICS**
 for
Snow Plows

**SPECIFY MONARCH
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 for new or existing
 snow plow equipment



- Type H.E.P. "Dynamight" Electric Power Control
- Fits All Trucks
- Available For 6 or 12 Volt Systems
- Fan Belt Driven Models Also Available



• Write Hydraulic Division
MONARCH ROAD MACH. CO.
 324 North Front Ave.
 GRAND RAPIDS 4, MICHIGAN

**SUPERVISING ON
 MAJOR BUILDING JOBS**

... Continued from page 65

must hire the same union men at the same wage scale, buy, place the same materials and meet the same contract requirements, but it is the methods of construction and the supervisor of these men that often make the difference between profit and loss in the construction business.

Equipment management

Thorough knowledge of all the types of construction equipment and machinery is important to the successful operation of any project. Good management of equipment purchases and rentals may result in great returns to the contractor. First, consider the length of time each piece of equipment will be required. This can easily be determined by the job progress schedule. Then determine the size and number of pieces of equipment required to do the work.

It is important to listen to the high pressure talk of equipment salesmen, but you yourself must keep an open mind about all the advantages and disadvantages that each manufacturer has to offer. Keep in mind that long after the sale is made you must set up, start, operate and maintain the equipment. On large projects with more than a 6-month construction period it is often more economical to buy small equipment (i.e., hand power tools, form ties, etc.) than it is to rent.

A profit can be made by buying cranes, compressors, power concrete buggies, skip loaders, hoists, and other heavy equipment if the construction period is 18 months or longer. A superintendent should know first-costs, depreciation, maintenance costs, fuel consumption, rental rates (bare and fully operated) and resale value of the many types of equipment used in the construction industry.

About wages

Just a line or two about the working conditions and wages of a superintendent on a big building job. You must remember that workmen have their unions to protect their conditions and that the contractors have their associations to protect their rights, but the superintendent must do his own bargaining.

There are many skilled superintendents who would gladly work for laborer's wages providing the contractor would pay them for their overtime. Since this is not usually the arrangement, a superintendent is placed on the payroll as the highest paid man on a weekly or monthly salary and then he does whatever is necessary to build the project. Sometimes the going is rough for a superintendent, but as a leader of the men

who are looking to him for guidance and advice he receives gratifications beyond monetary limits.

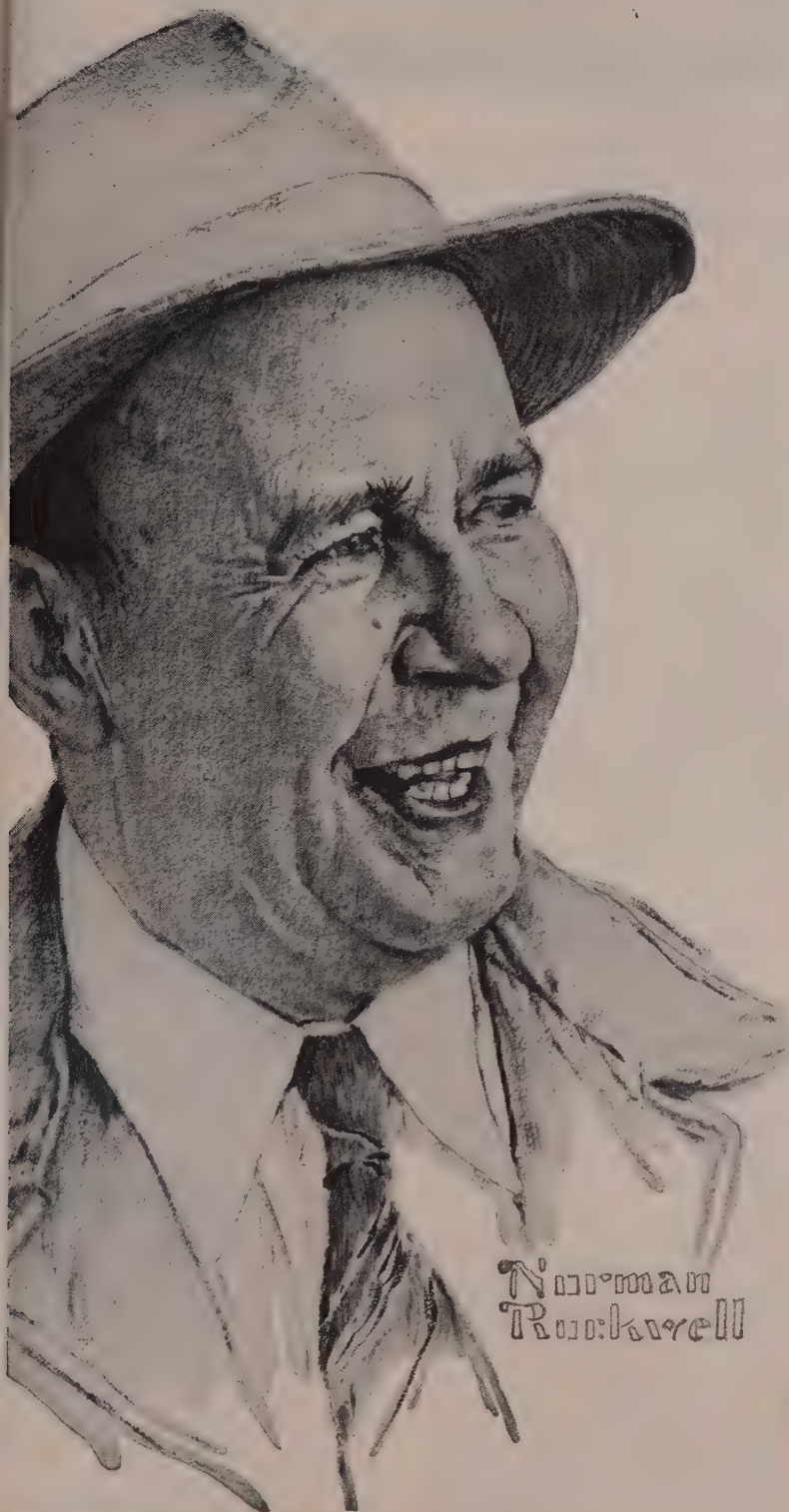
My father, who was an old time contractor, frequently said, "Give me what I can save on the buying and on the waste on the job for my profit." A superintendent should expedite the payment of material purchases to receive the discounts; they can total up to large sums at the end of the project. Waste always occurs in the course of construction on any project but you should always strive to keep it to a minimum. Familiarize all the foremen with the used lumber available and be firm in preventing carpenters from continually cutting long lengths of material when small pieces are close by ready for immediate use. See that concrete crews keep the concrete spillage and overruns down to a minimum.

An effective way for the superintendent to get better understanding among foremen and to direct the work in general is to have a foreman meeting at least once each week. A blackboard can be used to illustrate your main points of discussion. Ask for questions and problems from them as a group. This will relieve all the minor irritating items from their minds and goes a long way toward maintaining harmony on the job.

My hobby is taking pictures of the projects which I supervise. I take large black and white pictures for my albums and 35 mm color pictures to project on a screen to illustrate lectures. I keep my cameras on the job loaded with films. As I inspect the progress of the work I take pictures of equipment, formwork, special details and general progress shots. Many times these pictures have been invaluable in accident cases, disputes, and in giving talks before engineering groups.

It's up to you

To be of real service to your contractor, you must have knowledge of all of the foregoing phases of work. During regular working hours the superintendent directs the overall job operations to keep the quality of the work high and labor cost at a minimum. Exhibit a driving spirit that will instill ambition and the desire to push ahead among all of the men. A little time spent in the quiet hours of the morning or the evening in doing routine paper work and planning the work ahead will make your job easier. Gather men about you who know their work and will carry out your policies and orders correctly. If your men do a job well tell them about it; it's easy enough to become an "old sour puss" in running a construction job. Be firm and decisive and you will command respect. Remember—with hard work there is a sense of achievement and later on it is a thrill to pass by and view your monuments to humanity.



**"Save
money?"**

Sure!"

THAT, in a nutshell, tells you why so many wire rope users in excavating and construction prefer Roebling wire rope ... it speeds up operations ... lasts longer on the job ... saves money that really adds up.

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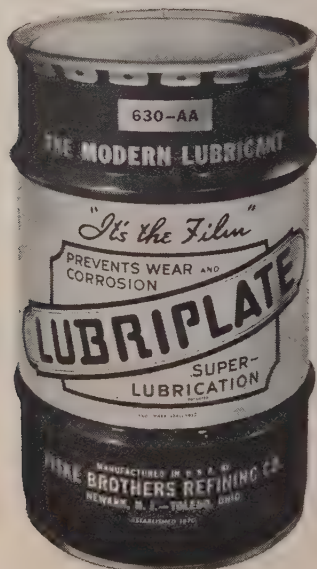
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RECOMMEND
LUBRIPLATE
LUBRICANTS"**

—says PORTER-CABLE MACHINE CO.,
Leading mfrs. of portable electric tools

"LUBRIPLATE reduces drag, permits easy starting, quiet operation and protects our machine parts against progressive wear. LUBRIPLATE is initially applied to our tools at the factory. For future lubrication by users, we secure LUBRIPLATE packed in tubes for distribution through our dealers."

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**REGARDLESS OF THE SIZE
AND TYPE OF YOUR MACHIN-
ERY, LUBRIPLATE
LUBRICANTS WILL IMPROVE
ITS OPERATION AND REDUCE
MAINTENANCE COSTS.**



NEW LITERATURE

Note: Items numbered 1101 to 1126 for the New Literature section will be found on page 81.

1127

Power take-off drive explained

The new power take-off drive for tractor-trailers, developed by **Stow Manufacturing Co.**, is described in Bulletin 533 from the company. This drive, consisting of a 1 1/4-in. flexible shaft in combination with a telescopic rod and tube, is said to do away with delicate and expensive power couplers and to take care of the change in length of the drive when the tractor-trailer is jackknifed.

1128

Westinghouse welding products data

Rating tables, electrical specifications and application data on Westinghouse AC-DC industrial welders, portable and skid-mounted, are graphically illustrated in a series of 4 welding products catalogs. Forty pages of good information for the welder, welding engineer, process engineer or maintenance man. **Westinghouse Electric Corp.** (B-5452, 5453, 5455, 5622)

1129

Roll crusher information

Not a single failure of the monolithic frame and not a shaft failure in 30 years is claimed for the Lippmann roll crusher in an illustrated booklet (1120) offered by the **Lippmann Engineering Works**. By means of cutout illustrations and engineering data, the booklet explains the reason for this excellent record and furnishes a sheet for the reader to submit the specifications of his work to the firm for its recommendation of the type and size of secondary crusher best suited to the purpose.

1130

Use of crane in precast work

A 12-page book on the application of Lorain cranes to the tilt-up method of precast concrete slab construction is offered by **Thew Shovel Co.** Company states that while many types and sizes of its cranes are being used on precast work, it recommends the rubber-tired Moto-crane because of

its ability to lift the slab and roll quickly into position to set the slab in place. Booklet shows many such cranes in actual working shots and gives detailed job data.

1131

P&H electric shovel line

A beautifully illustrated brochure on the complete line of P&H electric shovels is now available from **Harnischfeger Corp.** Each model in the "Magnetorque swing" line is shown in full color on the-job pictures with brief specification tables.

1132

Covers portable compressors

All of the necessary information, including complete specifications, about the models 160 and 210 Super Chief 2-wheel, 4-wheel and skid compressors is contained in a 6-page folder published by **Davey Compressor Co.** Both action and still photographs illustrate these gasoline- or diesel-powered models. Some of the units' most important working parts are also given coverage.

1133

Guide to selecting portable space heaters

Complete safety considerations are what is emphasized in this booklet on the selection and use of portable space heaters by **American Air Filter Co., Inc.**, manufacturer of Herman Nelson portable air heaters. The combination of text and drawings tells you about the advantages and disadvantages of direct and indirect fired heaters, facts about fuels and other necessary considerations, particularly that of the importance of proper ventilation.

1134

Horton reservoir catalog available

An attractive illustrated catalog on Horton steel reservoirs and standpipes is available from **Chicago Bridge & Iron Co.** Specifications are given for both ground-level and gravity operated storage tanks, with capacities of 50,000 to 10,000,000 gal. Illustrated are some of the installations made for municipal and private water distribution systems.

1135

Concrete information from A. C. Horn

The results of tests made by the research staff of **A. C. Horn Co., Inc.**, on the use of ordinary carbon blacks to darken air-entrained concrete are

own in a 6-page folder on the company's AD Dispersed Black product. Detailed test data and uses of the AD Black required under varying conditions are covered. The company also offers test results and application facts on its Dehydrative No. 80, concrete admixture to accelerate set and increase the strength of concrete and cement mortar.

1136

Rubberizing asphalt pavement with a new product, "Rubarite"

Of interest to highway construction men and others using asphalt subject to climatic conditions is this treatise-booklet, published by Rubarite, Inc., on its synthetic product for rubberizing asphalt pavement. Tracing the history of rubberized asphalt from the use of ordinary sheet rubber, the text explains how Rubarite (synthetic rubber particles) was developed. Illustrations show first rubberized road and later installations.

1137

Schild Bantam C-35 Crawler crane excavator

All of the important information about the C-35 crawler crane excavator is aptly contained in a 4-page color brochure released by Schild Bantam Co. Over 25 photographs illustrate the machine's leading features and its various attachments, such as the $\frac{3}{8}$ -cu. yd. dragline bucket, $\frac{3}{8}$ -cu. yd. backhoe, $\frac{3}{8}$ -cu. yd. clam-shell bucket, pile driver, $\frac{3}{8}$ -cu. yd. shovel, 29-in. electric magnet, scoop grapple, concrete bucket, and back-filler. In addition, the brochure contains general specifications, a table of crane capacities, trench hoe specifications, shovel specifications, and diagrams showing both the trench hoe and the shovel movements. The accompanying text sums up all the important engineering features.

1138

Preventing reservoir leakage

Case history folder from American Bitumuls & Asphalt Co. describes use of Laykold weathercoat in constructing impervious membranes for water storage facilities. Construction details on a recent project as well as general information are given.

1139

Portable electric tools and their uses

Which tool is the best for the job on hand? A new 28-page catalog issued by Porter-Cable Machine Co. covers 52 portable electric tools and



Master-Made

FOR FASTER WORK AND TROUBLE-FREE SERVICE



Now easy-to-operate scientifically balanced Gas or Electric TURN-A-TROWEL, Size 34" or 48". Catalog MV-939.



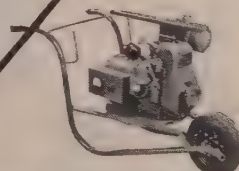
New Concrete Vibratory Finishing Screenshot, sizes 6' to 36', flat or arc crown. Catalog MV-942.



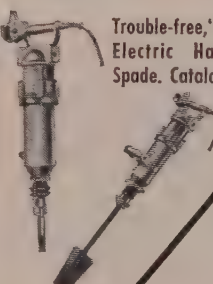
Gas or Electric Flexible Shaft Concrete Vibrators. Catalog MV-964.



"Master Champ" Hycyle Vibrator, 10,300 RPM. Catalog MV-992.



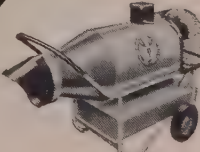
Portable Gas-Electric Generator Plants, 500 to 17,000 watts. Catalog MV-985.



Trouble-free, "Power-Blow" Electric Hammer and Spade. Catalog MV-981.



Gas or Electric Backfill Tampers. Catalog MV-699.



New Superfast Master Space Heaters, 140,000; 231,000 and 390,000 BTU per hour. Catalog MV-1045.

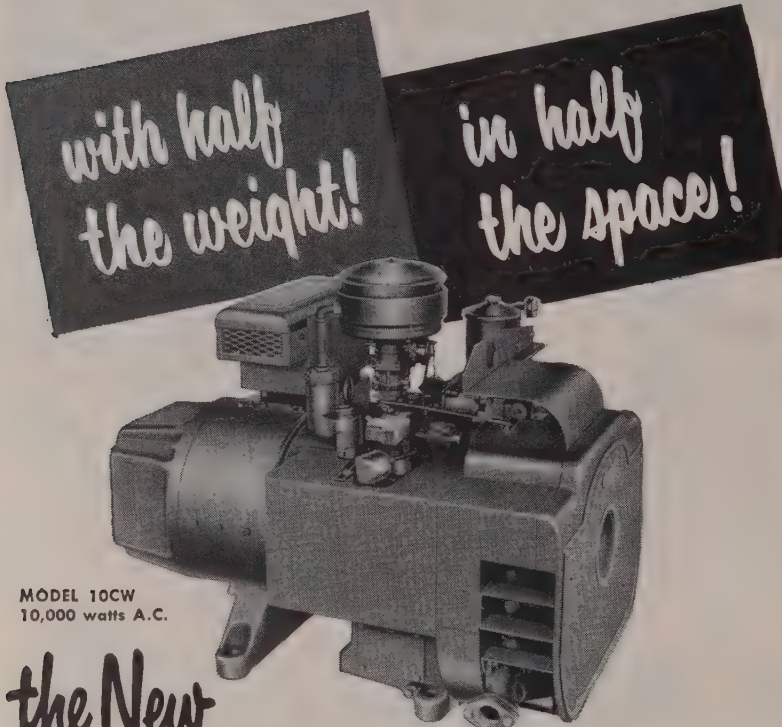
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ANDREWS EQUIPMENT SERVICE	Spokane, Washington
WESTERN EQUIPMENT CO.	Boise and Idaho Falls, Idaho
WESTERN CONSTRUCTION EQUIPMENT CO.	Billings and Missoula, Montana
FOULGER EQUIPMENT	Salt Lake City, Utah
SIERRA MACHINERY CO.	Reno, Nevada
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MODEL 10CW
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Check these advantages!

- ★ High capacity for big jobs.
- ★ Twin-cylinder, horizontally-opposed, air-cooled, alternate-firing engine.
- ★ Aluminum-alloy cylinder heads.
- ★ Extra-large, replaceable bearings.
- ★ Full-pressure lubrication, 6-quart oil capacity, oil filter.
- ★ Impulse-coupled, high-tension magneto ignition; radio suppressed.
- ★ Quiet, vacuum air cooling of generator and engine.
- ★ Excellent accessibility; snap-off housings.
- ★ Extremely quiet running.
- ★ High performance generators.
- ★ Completely equipped with controls and instruments.

Costs less than any other complete electric plant!

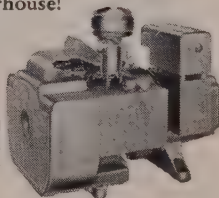
You can't match it anywhere in performance, equipment or value. The sensational new Onan 10CW gives you everything you've wanted in an electric plant plus exceptional mobility for a unit of its capacity.

On large construction jobs, where wattage requirements for power tools are high, or where floodlighting of extensive work areas is essential, the Onan 10CW delivers all the electric power you need.

Before you buy another electric plant for any purpose, take a good look at this new low-cost powerhouse!

Model 5CW 5,000 watts

Same advanced design as the 10CW with all its exclusive advantages. Built for heavy duty, economical operation.



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ETS-HOKIN & GALVAN
551 Mission St., San Francisco, Calif.
218 N. Avalon Blvd., Wilmington, Calif.

FREMONT ELECTRIC COMPANY
744 North 34th, Seattle, Washington

SPARKS AND WILLS COMPANY
1624 S.E. Grand Avenue, Portland, Oregon

kits with over 400 attachments for general use as well as for use in the construction industry. The tools are clearly illustrated by photographs and descriptive text recommends best applications for each. In addition, specifications, and (or) accessory and standard equipment are listed. Tools covered are electric saws, sanders, grinders, drills, planes, routers, shapers, combo-tools, radial arms, blades, abrasive wheels and discs. Price 10¢.

1140 108-page handbook on concrete specialties

W. J. Burke & Co. offers a complete, thumb-indexed 108-page handbook of specifications and application data on its line of form clamps, snap-ties, beam hangers, scaffold jacks, reinforcing bar accessories, column clamps, curing and tilt-up compounds and sprayers, expansion joints and sealing compounds, air entraining, etc. Excellent information for anyone working with concrete.

1141 Rolled steel products by Bethlehem Pacific

Bethlehem Pacific Coast Steel Corp. is offering a new 43-page catalog 305-A listing all the steel sections which can be rolled on seven rolling mills at its three steel plants on the West Coast. The size, weight per foot and design properties of all the structural and bar size shapes are presented. The catalog also includes a commodity listing of wire produced at the Los Angeles plant, a tabulation of bolt and nut products, and a list of special analysis steel available.

1142 How to get your engines started in cold weather

Literature published by KIM Hotstart Manufacturing Co. tells you how to cut the cost of cold weather operation of diesel and gasoline engines through installation of their electric pre-heaters, a device which plugs into any electrical outlet and through a percolator-like action keeps engines ready for instant starting even in sub-zero weather. The 8-page brochure illustrates typical installations and provides specifications for various sizes and types of engines.

1143 On efficient rivet passing

Pennsylvania Flexible Metallic Tubing has published a 4-page booklet which tells you all about how its pneumatic rivet passer, a tube device which delivers scale-less, hot rivets at long distance with lightning speed. And its safety advantages are stressed.



—the chance of being hit with a hot rivet in hand passing is eliminated. The literature tells you how the rivet passer is built, adjusted and operated. Drawings and photographs are included, plus additional information on three types of Penflex metal hose.

1144

Describes Baker power control unit

What you need to know about performance details and new design features of the power control unit PCU-75 is contained in this 4-page folder issued by **Baker Manufacturing Co.** Describes the unit's salient features, its multiple-disc clutch, simplified brakes, adjustable hand levers and sheave mountings. Full specifications for all these parts are included.

1145

Loading problems simplified

How to solve your loading problems in sand, snow and mud are taken care of in this descriptive 4-page folder issued by **West Coast Machinery, Inc.** The literature tells you all about the Westcoaster utility loader, and includes action shots, a photographic analysis of the machine's basic parts, and a specification table.

1146

Facts about power shovels and cranes

Thew Shovel Co. is offering a new 2-color bulletin on its line of Lorain "80" Series of power shovels and cranes. Every angle is covered by action photographs, showing the versa-

tile machine on the job as a shovel, crane, dragline, clamshell or hoe. Large detailed photographs (some cutaway) and text explain the design and construction features of the individual working parts. Other important engineering details, such as the roller bearing-mounted swing shaft and hoist drum, the hydraulic coupling which prevents shocks and stalling in shovels, the combination third drum and precision boom lowering device for cranes, the air controls, and choice of crawler sizes and front end equipment, are fully described and illustrated.

Literature briefs . . .

1147

LOADER—How to cut loading costs by use of the new Sierra loader is the subject of an illustrated brochure by **C & D Manufacturing Co.** Presents specifications and tells about the machine's ample clearance, fast-cutting disc plow, fingertip control and high maneuverability.

1148

NUTS AND BOLTS—A new data sheet by **Murphy Diesel Co.** gives complete standard nut and bolt dimensions and thread data. Should be a handy reference guide for all concerned.

1149

SCRAPER BLADES—Made-to-order blades for scrapers, scarifiers, snow plows, graders and so forth are

the subject of a 4-page booklet by **Shunk Manufacturing Co.** Tells you how to order these high-type steel blades for standard and not-so-common construction equipment. All are manufactured according to exact specifications.

1150

RETRACTABLE WHEEL CHOCK—The many uses to which the safety retractable wheel chock can be applied are covered in a 4-page illustrated brochure recently issued by **Calumet Steel Castings Corp.**

1151

LIFT TRUCK OPERATION—A 2-color cartoon technique is used in this informative bulletin telling about the operation of a lift truck, preventive maintenance, safety and basic materials handling. This booklet has been issued by **Hyster Co.**

1152

VIBRO-TAMPERS—Construction details and operational advantages of the Vibro-Tamper when used in single-course, water-bound macadam construction are described in an illustrated 4-page bulletin by **International Vibration Co.**

1153

PIPE—Special features and facts about pre-sealed insulated pipe for use in underground and weather-exposed locations for conveyance of hot or cold liquids and gases are taken up in a 4-page bulletin by **Durant Insulated Pipe Co.** Diagrams explain field joint procedure for installation of this conduit.

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More information on any of the items in this section may be obtained by using coupon on page 139.

1154

New load transfer assembly is lightweight, can be placed and staked by one man

Take a look at this new load transfer assembly that weighs only $4\frac{1}{2}$ lb. per lineal foot yet is designed to carry loads heavier than standard road and airbase dowel and load transfer assemblies. Different from conventional dowel supports, the unit is actually a complete load transfer assembly. The rod frame acts as a working part of the unit, helping to distribute the traffic load through the entire end of the concrete slab in which the assembly is used. Stress reducing coils are an integral part which helps prevent crushing of concrete at the critical face of the



joint. Tests have shown that the unit deflects one-third less than standard. The assembly can be used for either contraction or expansion joints. Designed and produced by Richmond Screw Anchor Co., Inc.

1155

Portable plant handles 350 tons per hour of $\frac{3}{4}$ -in. minus aggregate

The new "All American 77", announced by Diamond Iron Works, Inc., incorporates all the features of the predecessors in its line plus new improvements which promise increased production. The portable crushing and screening plant is completely mobile for highway transportation and can be towed as a trailer or as a separate unit. An outstanding feature is a hydraulic mechanism for raising and lowering the large 4 x 12-ft. vibrating screen to and from travel position. This is easily controlled from the operator's platform. Another feature is a large oversized 36 x 22-in. roll crusher designed to crush $2\frac{1}{4}$ -in. material to $\frac{3}{4}$ -in. aggregate, thus relieving the 10 x 36-in. jaw crusher of preparing material to $1\frac{1}{4}$ in. for crushing in a smaller set of rolls. Also, the plant's 4 x 12-ft. screen set at the proper angle for efficient screening allows

more screening area and also provides better segregation of aggregates. According to the manufacturer, the new plant was designed to meet two primary demands: (1) the



greatest possible production of uniform aggregate in an uninterrupted flow at the lowest possible cost per ton; (2) complete maneuverability on the road and in the pit, keeping in mind the highway traveling restrictions.

1156

Flexible shaft power take-off drive easy to install on dump trailers

Already pretested on contractors' operations, here's an efficient, low cost power take-off drive that eliminates expensive and delicate power couplers. The new drive, used to run a pump for a hydraulic hoist, consists of a $1\frac{1}{4}$ -in. flexible shaft in combination with a square telescopic bar and tube. The flexible shaft provides a powerful, quite flexible drive, which requires little maintenance. Also, since the flexible shaft absorbs shock loads, the pump life is increased considerably. The telescopic rod not only acts as a simple, fool-proof, quick-disconnect



coupling, but it also takes care of the change in length when the tractor-trailer is jackknifed. A universal joint of 1,800-in. pound capacity is used between the pump and the telescopic rod so that the flexible shaft does not have to be bent so severely. By using different length extension bars at the power take-off end, dump truck operators may use the same length flexible shafts for entire fleets so that a few shafts may be stocked for quick replacement. I powered 5th wheels are already in use, short flexible shafts may be used to connect from the power take-off shaft to the universal joint at the powered 5th wheel. This eliminates several universal joints and the sprocket drive. Manufactured by Stow Manufacturing Co. Illustrated is an actual contractor installation of the new drive for hauling 16- to 18-ton loads.

1157

Slab brace with pivoting action speeds precast panel work

Designed for fast and efficient positioning in adjusting recast concrete panels, this new adjustable slab brace as exclusive pivoting action and is used with 2 x 4's or

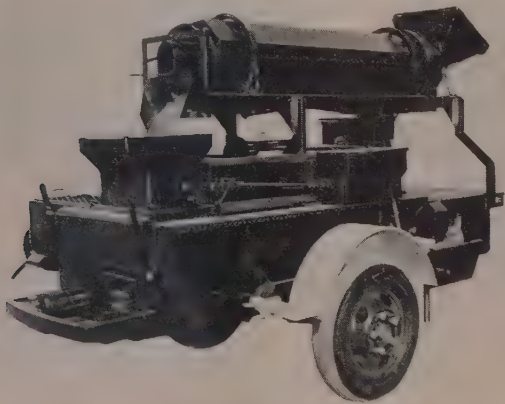


2 x 6's of standard length to fit individual jobs. The brace is also available with fittings for use with pipe instead of lumber. Make-shift, inefficient methods of positioning slabs are eliminated. A new 4-page bulletin gives details. Manufactured by Superior Concrete Accessories, Inc.

1158

Portable hot asphalt plant ideal for patching jobs

An easy and practical way to save major paving repairs by making small patches when needed is use of the new model Patchmobile PM 215, which requires no other equipment on the job except a dump truck for towing and hauling sand and gravel for the mix. The unit features a rotary dryer, asphalt tank, pug-mill, power asphalt pump with spray attachment, volumetric asphalt measuring de-



vice, and asphalt tool-heating compartment. You don't need to handle aggregate and asphalt during the entire mixing process because the aggregate is shoveled from the dump truck into the charging chute of the rotary dryer, and as the dryer rotates, the material is conveyed to the discharge chute and into a batching hopper directly above the pug-mill. As the hot, dry aggregate is released into the pug-mill, the correct proportion of hot asphalt is discharged into the pug-mill through a spray bar. As the asphalt reservoir is emptied it is immediately refilled by a power-driven asphalt spray pump. Aggregate and asphalt are mixed and conveyed through the pug-mill to the discharge gate where the material is ready to be used.

Specifications of the Patchmobile are: weight, 3,735 lb.; 165-gal. asphalt kettle, also available with compartments of 110 and 55 gal., and a model AEH 4-cycle Wisconsin air-cooled engine. It is recommended for maintenance of streets, highways, airport runways, parking areas, railroad crossings, for building driveways and sidewalks, and for mixing mastic material for floors and bridge decks. Manufacturer is Wylie Manufacturing Co.

1159

Multiple compactor makes quick work of macadam and granular sub-base



Here's a compactor designed to do specific types of jobs for highway work common in the West. On macadam base work, it is claimed that the multiple machine will, in one pass, sufficiently compact 12 in. of rock to support smooth rollers; and in four passes it will key and compact to final density. Furthermore, when enough dry fines are spread on top in one application, it is claimed that it requires just two passes for the vibrator to completely fill the void from top to bottom of the course. In gravel sub-base work, with blanket course of 7 in. and at optimum moisture, the machine is said to obtain densities exceeding 100% of Standard Proctor in one pass. The multiple compactor consists essentially of the proper assembly and suspension of individual vibratory compactors. Separate units may be removed on the job to meet conditions requiring narrower widths than standard 13-ft., 3-in. width. Manufactured by Jackson Vibrators, Inc.

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Contractors' Pump Bulletin 8-CP-11 furnished on request.

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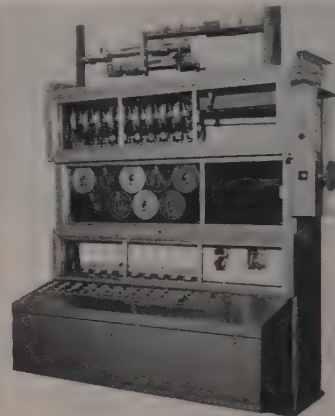
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1160

Concrete mix control panel for 120 sizes and types

Extreme flexibility of concrete mixing operations is possible with the new 120 mix selector announced by C. S. Johnson Co., subsidiary of Koehring Co. The selector is a push-button control panel which enables the operator to produce 120 different size and type batches of aggregate and cement, five times the selection ability of any previous model. As in the earlier selectors developed by the



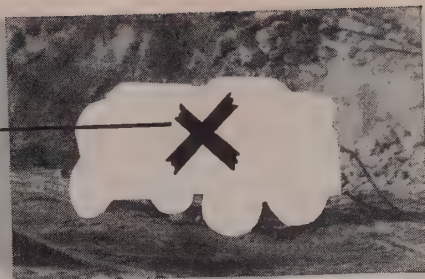
firm, a "repeater" mechanism provides for uninterrupted automatic rebatching of any one selection a predetermined number of times. The mix selection mechanism is electrically controlled and is installed under the Johnson multiple compartment aggregate and cement bin. A mix number indicating wheel and a hand wheel located on the right hand side of the control cabinet are the added control devices which make the various "mix" selections possible. Through proper shafts and gearing this master wheel positions selector wheels, one for each material, rapidly setting the cut-off weight for them. Complete details on request.

1161

4-wheel-drive Shovel loader announced

A new front-end Shovel loader has been described as "an excellent unit for jobs requiring high capacity loading under very rugged conditions." Rated at 1½-cu. yd. capacity with a recommended working capacity of 6,000 lb., peak capacity of 9,000 lb., the machine is equipped with positive 4-wheel drive and is designed to eliminate need for a center differential transfer case. Hi-flotation tires and high under-clearance permit its efficient operation under bad ground conditions. A 23-in. oscillation of the unit's rear axle keeps all four wheels solidly in ground contact on rough terrain, insuring best functioning of the 4-wheel drive. Includes a 5-speed forward or reverse transmission, power steering on all 4 wheels (op-

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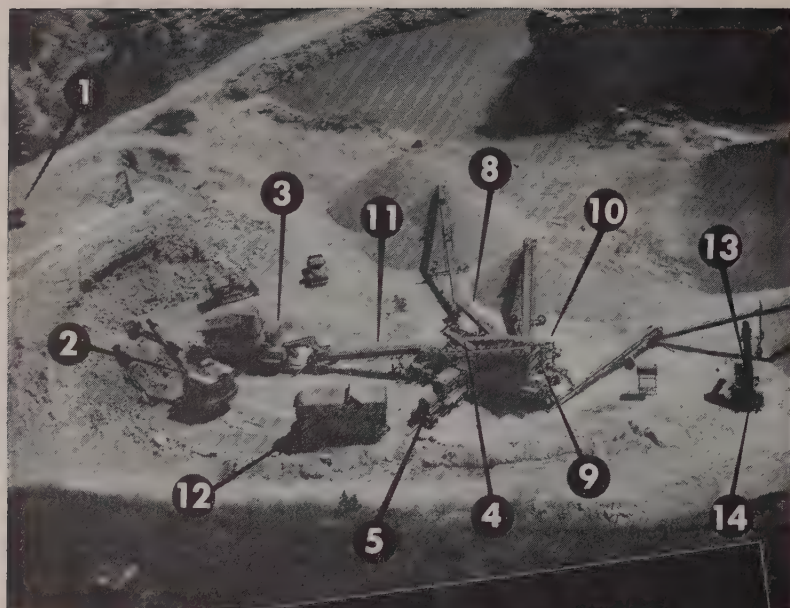
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TWIN DISC 14 Drives in action!

Typical example of powered equipment in modern industry is Stoneridge Limestone Company's aggregate plant near Rochelle, Ill. And typical example of Twin Disc's complete range of Friction and Hydraulic Drives is the aerial photograph above of the Stoneridge operation. Nine of the Twin Disc Drives were built-in by the original equipment manufacturer . . . five were installed by Stoneridge.

Whether built-in or added for extra performance, Twin Disc Drives have the *right design, construction and capacity*. See your Authorized Twin Disc Hydraulic Dealer.

And here they are . . . count 'em!

Twin Disc Spring-Loaded Clutch on International-powered LeRoi Compressor (1).

Twin Disc Friction Power Take-Offs on Cummins-powered Bay City Shovel (2); Caterpillar-powered Universal Jaw Crusher (3) and Universal Hammer Mill (4); and on Minneapolis-Moline-powered Pioneer Roll Crusher (5).

Twin Disc HYDRO-SHEAVE® Drives on Stoneridge-built horizontal conveyor (8); Simplicity Vibrating Screen (9); Pioneer Vibrating Screen (10); and Stoneridge-built Conveyor (11).

Twin Disc Hydraulic Coupling on Hercules-powered generator plant (12).

Twin Disc Friction Clutches (two each) on Nelson P-10 Loader (6, 7; not shown); and Nelson P-11 Loader (13, 14).



TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

tional), special axle design, and special attention to operator safety and ease. Accessories available include 1¼- and 1½-cu. yd. material buckets, a 2½-cu. yd. coal and snow bucket, lifting forks and bulldozer. Manufacturer is Baker-Lull Corp.

1162

Side-dump body for standard dump truck application

A new special side-dump body, manufactured by Galion Allsteel Body Co., is claimed as the first such body to employ double lift arm action on a standard dump truck application. These double lift arms are said to assure the operator of a well balanced, controlled thrust originating from various Galion hydraulic hoist models selected to meet load require-

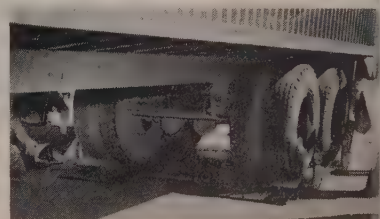


ments. Bodies can be made from 8 to 10 ft. in length, with capacities of 3 to 6 cu. yd. The body is claimed to be ideal for quarry operations and construction jobs on narrow roads which require gravel, sand, cinder, slag and other building materials to be dumped on the berm. It can be constructed to dump either to the right or left. Dump angle is 45 deg., and 4 steel forged hinges form a pivot point which eliminates damaging warp and twist to the truck frame when the body load shifts.

1163

Mobile scales available for on-the-spot truck weighing

A mobile truck weighing station which solves the problem of weighing loads in areas without permanent scales recently has been invented by



an inspector with the Ohio State Highway Patrol. This automatically operated station carries four scales and makes weighing tandem axle semi-trailers virtually no effort for the weighman. At present the only means of weighing trucks using road-

without weighing stations is to carry portable scales and blocks on which to form ramps, and as such has proved ineffective. This new mobile weighing station can be made permanent within minutes and because it is operated hydraulically, it ends the problem of injury to weighmen handling the scales. The unit consists of a special trailer frame with the scales. By simply pushing a lever ramp the scales are lowered to the pavement and are immediately ready for operation. Manufacturer is Gledhill Road Machinery Co.

1164

Catalytic exhaust system eliminates fumes in enclosed working areas

Use of an OCM catalytic exhaust system when excavating the poorly-ventilated basement of a church eliminated the noxious effects of exhaust odors from the gasoline-powered excavating equipment. By substituting this device for the regular muffler it proved that gasoline-powered construction equipment can now be easily and economically converted for safe operation indoors and in such places as mines and tunnels. The OCM catalytic exhaust system oxidizes poisonous carbon monoxide and hydrocarbon vapors, exhausting a harmless effluent to the working atmosphere. The units can be installed

on any mobile or stationary gasoline engine running on unleaded gas and are easily adapted for use on LPG engines. Manufacturer is Oxy-Catalyst, Inc.

1165

Gradall goes on crawlers, adds two new attachments

Availability of the Gradall in a new crawler-mounted hydraulic-drive unit is announced by the Warner & Swasey Co., manufacturer of this multi-purpose earthmoving and construction machine. The unit as pictured



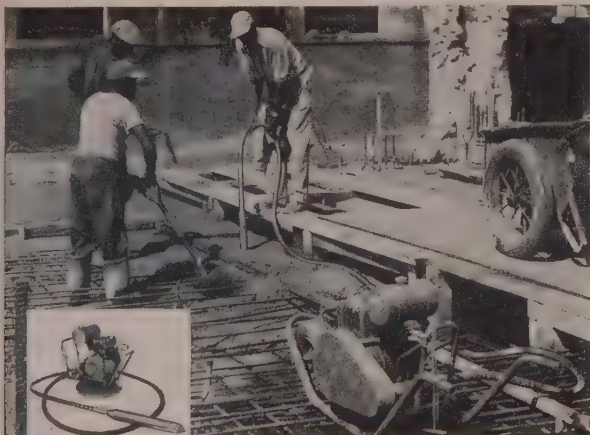
herewith is designed especially for a customer to use in underground work and has a heavy-duty screen cab enclosure for the operator's protection and convenience. Developed to further broaden the application of the unit, the crawler mounting enables the Gradall to handle a number of additional jobs since it can now be utilized in areas inaccessible to pneumatic-tired equipment.

Two boom-extension attachments for the Gradall are also announced. The first attachment is a 12-ft. extension which, affixed to the regular telescoping, 24-ft. boom of the unit, extends its working reach to 36 ft. Used only with an 8-ft. blade, this extension is particularly suitable for grading and sloping operations. The second boom extension is a 4-ft. unit, which is intended for use with digging buckets up to 24 in. With it, the digging depth of a Gradall is increased from 10 ft. to approximately 14 ft., normal dumping height of 14 ft., 9 in. is increased to over 17 ft., and the reach of the unit lengthened from 24 to 28 ft. Both extensions are quickly and easily mounted to the regular Gradall boom. To adapt any Gradall for use of either extension, the regular bucket stop on the end of the telescoping boom is removed and replaced with a combination bucket stop and link, which is supplied with each extension. Full details on request.

1166

Sectional steel hoist tower has 4,000-lb. capacity

Made of prefabricated frames to provide safe capacity for medium-duty service, this lightweight tower by the Patent Scaffolding Co., Inc., employs frame-type construction and quick-acting locks for ease and speed



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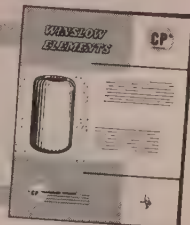


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Winslow Engineering Company 4069 Hollis St., Oakland 8, Calif.

of assembly. Maximum load is 4,000 lb.; maximum height is 130 ft. Erection is simplified by a one-piece base unit, and top channels that readily slip over frame legs without requiring clamps or bolts. Portal frames provide openings in the tower at any required level. Literature available.

1167

New Case loaders have fast operating cycle



Two new "Powerloaders" introduced by the J. I. Case Co. offer a high rate of working capacity, coupled with the other features of exceptional ease of operation, unusual visibility and comfort for the operator. Designed and developed completely by Case, Models 30 and 40 have basic bucket capacities of $\frac{5}{8}$ and $\frac{3}{4}$ yd., respectively. Both models have

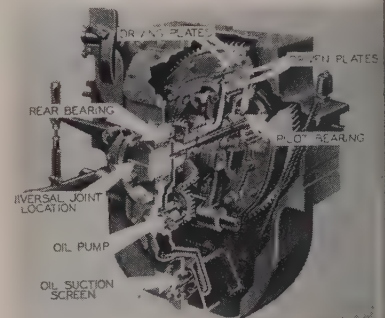
more than 10 ft. clearance under bucket at full height, more than 8 ft. when dumped. Both have digging depth, with bucket tilted, well over 2 ft. Both lift full height from ground in $6\frac{1}{2}$ sec., lower in $4\frac{1}{2}$ sec., dump in 2 sec. Helping the operator to make full use of this fast cycle is a sight gauge which indicates what the angle of bucket will be when it reaches ground level. Thus he can set the bucket during his $4\frac{1}{2}$ -sec. descent, avoiding any delay for adjustments before starting to load. Further information available by circling key number on coupon.

1168

Oil-type flywheel clutch for Cat track-type machines

Here's the first successful oil-type clutch to be put into use in the crawler tractor field. It is now standard equipment on the Cat D8, D7 and D6 tractors and the Caterpillar No. 6 shovel. The titled cutaway illustration shows the inner workings of a model of the new clutch. In the closed housing the pump lifts the oil from the reservoir at the bottom of the housing and forces it through and around the clutch shaft in a continuous process. The oil is discharged around the inside diameter of the friction discs. It flows through the grooves and slots and the friction faces and pressure plates even when

the clutch is engaged. The oil, ejected from the outside of the flywheel through radial slots, also provides constant lubrication for the cams bearings and internal linkage. When the clutch is being engaged, the oil absorbs the entire load up until the last few revolutions before full engagement, at which time the friction faces finally come into direct contact



The constant flow of oil through the clutch acts as a cooling agent and makes this unit particularly adapted to severe service and high temperature operations found in the type of earthmoving work for which the machines so equipped are used. An innovation being introduced with the clutch is a universal joint which eliminates the need for close alignment between the clutch and trans-

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mission, thus causing lower maintenance problems in the clutch and transmission bearings and shafts. The oil clutch represents more than 11 years of research and development by **Caterpillar Tractor Co.** Full details on request.

1169

Twin cylinder dump body hoist is lightweight but husky

The Heil Co. now has available its new twin cylinder Model 2426 hoist, specifically designed for 8- to 17-ft.



long platform bodies and 8- to 10-ft. dump bodies. Operating features claimed for the all-hydraulic hoist include a 50-deg. dumping angle for swift and positive dumping of all materials, including sticky dirt; a low first cost because of simple construction; and a new low in mounting height, with the space from top of the truck chassis to bottom of the body only 9 $\frac{1}{8}$ in. The hoist can be used with an 8- to 10-ft. dump body, or any platform body—even a $\frac{3}{4}$ -ton or 1-ton pickup truck if the frame has no "kick up" and the outside width is 36 in. or less. It can be mounted by any competent mechanic in a few hours time. Payload capacity, depending on application, is $\frac{3}{4}$ to $6\frac{1}{4}$ tons. Bulletin available.

1170

Pioneer "Mesabi" screens designed for heavier service

Redesigned to give heavier service, more efficient operation and greater durability, the "Mesabi" type vibrating screens built by **Pioneer Engineering Works, Inc.**, are now available in single-deck (for scalping) and

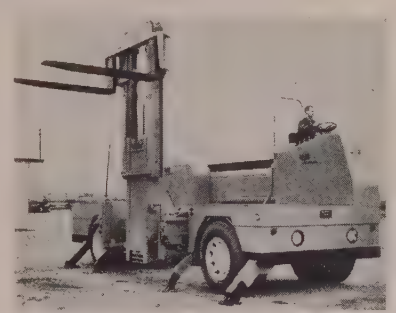
2-deck (for scalping and sizing) in the following sizes: 4 ft. wide—10 and 12 ft. long; 5 ft. wide—10, 12 and 14 ft. long; 6 ft. wide—12 and 14 ft. long. In the 2-deck scalping screen, the top deck is $\frac{1}{2}$ -in. punched plate and the bottom deck is wire mesh. The single deck scalping screen has a $\frac{3}{4}$ -in. punched plate deck. In the 2-deck sizing screen, both decks are wire mesh. Standard punched plates have square openings ranging from 2 in. to 8 in. in $\frac{1}{2}$ -in. increments. The main frame on all the 4-ft. screens has been redesigned to include an 18-in. car channel reinforced with 8-in. cross beams while the 5- and 6-ft. wide screens have been redesigned to include 18-in. I-beams reinforced with 8-in. cross beams. The new design makes the main frame assembly unusually strong. Vibration has been reduced to a minimum without sacrificing action of the screen pan.

1171

Fork truck and load carrier operates in a 12-ft. aisle

The new 30,000-lb. capacity Traveler loader picks up its loads from the side, hauls them lengthwise within the width of the unit and stacks them parallel to aisles. It is designed particularly for such long, bulky loads as lumber or steel stock. Stability is guaranteed since loads are carried in-board on the load deck. This unusual load carriage system allows the Tra-

veloader to safely travel at speeds up to 30 mph. When it stacks or unstacks, the unit gains stability through the use of hydraulically operated stabilizing jacks, controlled from the driver's seat. Its speed makes



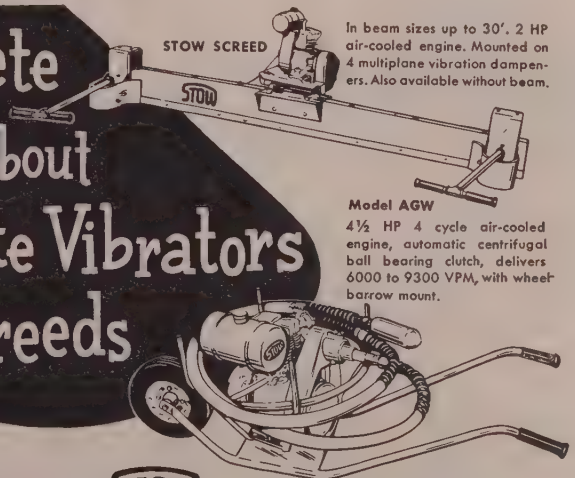
it useful also as a long haul carrier. One man controls the entire operation from his driving position. A variety of attachments including crane arms, rams and master pallets capable of handling multiple pallet loads at one time are available for special handling jobs. Manufacturer is **Baker-Raulang Co.**

1172

New transmission available for International Roadliners

A new easy-shift highway transmission is available in the R-195 and R-205 four-wheel Roadliners and in the 6-wheel RF-195 Roadliners equipped

Concrete facts about Concrete Vibrators and Screeds



Model BU
2 HP at 9000 VPM
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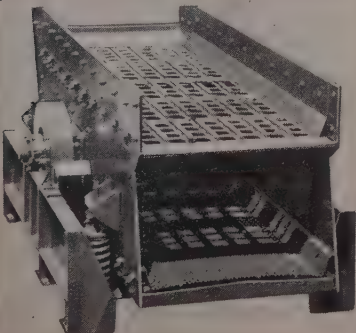
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The high operating speeds of the new STOW line of Concrete Vibrators make possible the use of heavy duty, light weight flexible shafting and lighter, more efficient vibrator heads—which speed operations, cut costs. And, STOW design provides convenient, practical speed control so attachments may be used directly on the vibrator shafts.

STOW SCREEDS—permit placing more than 300 cu. yds. in less than 8 hours; strike off and impact in one operation; leave surfaces true to grade; work up to and around manhole covers and obstructions.

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this **NEW** Cedarapids **SUPER** is the star performer

HERE'S the Cedarapids Super Tandem Gravel Plant *newly engineered* for star performance on jobs where gradation of a big volume of material is the most important of the plant operations. The Super Tandem is now built with a 48" x 12' Horizontal Vibrating Screen to give you the really high screening capacity that is a big advantage in any pit and is especially profitable where there's a high percentage of fines or contaminated material. Other Super Tandem features, like the 1036 jaw crusher, 2416 roll crusher and 30" wide conveyors, are engineered to handle this extra capacity with no increase in operating or maintenance costs. See your Cedarapids distributor for complete details.



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JACK SAHLBERG EQUIPMENT CO.
300 Aurora Avenue, Seattle 9, Washington

BROWN-BEVIS-INDUSTRIAL EQUIP. CO.
P. O. Box 15295 Vernon Station, Los Angeles 58, Calif.
P. O. Box 811, Bakersfield, Calif.

MERRILL-BROSE COMPANY
2792 Cypress St., Oakland 7, Calif.

R. L. HARRISON COMPANY, INC.
P. O. Box 1320, Albuquerque, New Mexico

ARIZONA CEDAR RAPIDS CO.
P. O. Box 6186, Phoenix, Arizona

SIERRA MACHINERY CO.
P. O. Box 1330, Reno, Nevada

TANDEM

for our jobs"

*Say the Place Brothers
of Scranton, Iowa*

"we're getting 100% more
screening . . . 25% more conveyor
than the Junior Tandem we operated
. . . 228 to 310 tons per hour . . .
steady operation day in and
day out . . . very low maintenance . . .

**THAT'S PROFITABLE
PERFORMANCE!"**



Burl Place (left) and LeRoy Place are producing $\frac{3}{4}$ " minus crushed gravel to the tune of a 228-ton per hour average . . . with peak production hitting 3560 tons in an 11½-hour day! Average per cent of crush was 20% with portions of the material wet, with some clay. Burl Place says, "This new Super Tandem is very trouble-free and dependable. We can plan on operating at full 11½-hour day every day, weather permitting, and maintaining the high average production that keeps us ahead of our competition."

**"OUTSCREENS ANY OTHER SCREEN I'VE EVER SEEN,"
says LeRoy Place**

"That big 48" x 12' horizontal screen is a humdinger for the kind of work we do . . . processing semi-wet material with a high percent of fines. For capacity alone, it outscreens any screen I've seen operate, and by reducing the circulating load, we have less wear on the crushers. Add the screen's trouble-free operation and the result is the extremely low maintenance, high capacity machine we need to operate a successful business in tough competition. Our maintenance cost runs less than $\frac{3}{4}$ of a cent per yard."

HIGH FLEXIBILITY

The Super Tandem is designed to handle a wide range of crushing and screening conditions. Optional equipment which increases flexibility includes swivel feed conveyor, spray bar attachments and sand ejector screw. Cedarapids Primary Crushing Unit used ahead of the Super Tandem converts it into a high capacity rock plant. "Packaged" Super Tandem separate units are available for stationary operation.

30" WIDE CONVEYORS

As part of the new-design efficiency of the Super Tandem, the width of the delivery conveyors, plant conveyor and under crusher conveyor has been increased to 30" to handle the greater production of the plant.

The newly engineered Super Tandem is designed specifically to meet conditions where extra-high screening capacities are necessary . . . but remember . . .

THERE'S A CEDARAPIDS PLANT TO HANDLE EVERY JOB!

The Master Tandem or Unitized Plant for the biggest jobs, the Commander Plant for high output of fine-crushed products, the Rock-It for producing roadstone and aglime, the Junior Tandem and Pitmaster for smaller jobs, the Cedarapids Single Pass Plant for low-cost road maintenance . . . a size and type to fit every job and every pocketbook.

FOR BITUMINOUS MIXING, the big Cedarapids Model E is ready for profitable big-job production, or the Master Plant, Model FA or Model PM Commercial Size Plant are available to meet any quantity, any specification requirement.

**IOWA
MANUFACTURING COMPANY**
Cedar Rapids, Iowa, U.S.A.



with Super Red Diamond 406 or 450 engines. It is an 8-speed model with all speeds accomplished with one shift lever. In shifting, it is not necessary that all 8 speeds be used each time a stop is made; where operating and load conditions warrant, every other shift can be skipped, or the truck started in the second or third gear. The transmission also is used in the RD-205 tractor. Manufacturer is International Harvester Co.

1173

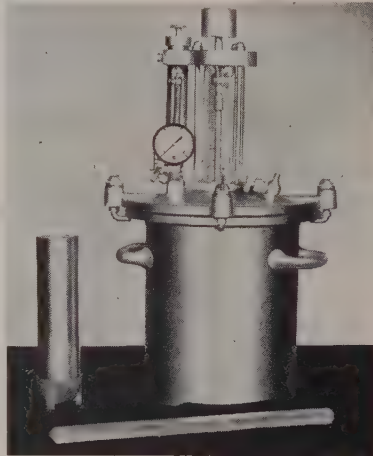
International Harvester adds 7 models to power unit line

With the addition of seven new 6-cylinder models, the gas-gasoline power unit line manufactured by International Harvester Co. now includes 12 engines ranging from 16.5 to 200 net maximum hp. These 7 valve-in-head power units and their hp. ratings are as follows: U-1091 (natural gas), 187 net hp. at 1,400 rpm., or up to 200 net hp. at 1,600 rpm. on factory-approved applications; U-450, 102 net hp. at 1,800 rpm.; U-406, 91 net hp. at 1,800 rpm.; U-372, 83 net hp. at 1,800 rpm.; U-269, 62 net hp. at 1,800 rpm.; U-240, 55 net hp. at 1,800 rpm., and U-220, 50.5 net hp. at 1,800 rpm. Basically, the new U-1091 and the International UD-24 diesel power unit have many common components. The other 6 new models are power units using International motor truck engines.

1174

Redesigned Protex airmeter easier to use, more accurate

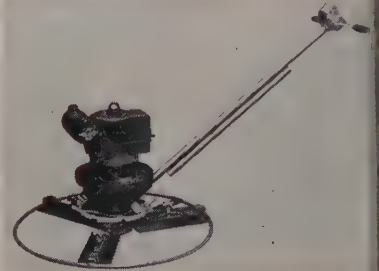
The new Protex air meter has many features including a built-in air pump, built-in funnel, new improved clamps, and is of the approved type widely used by government, state and private laboratories. Manufactured by the Autolene Lubricants Co., Industrial Division, manufacturer of Protex air entraining solution, the new meter has been designed to give easier, faster, more accurate readings and will sell for the same price as the previous model, \$98.50 f.o.b. Denver.



Both the old and new models operate on Boyle's Law, eliminating delicate pressure gauges and intricate procedure. No special training is needed for operator to get accurate results for the meter gives direct reading of per cent air in concrete.

1175

Powered concrete trowel does fast floating and finishing



Mall Tool Co.'s new model TG-Pow'r Trow'l has direct in-line drive for greater efficiency and transmission of its engine's full 2 hp., and to provide centered weight distribution for easy handling. It comes equipped with 14-in. tool steel finishing trowel set in a 34-in. diameter ring. Available at extra charge are the 18-in. floating trowels. Set in a 48-in. ring these drive out air pockets, bring to moisture and large aggregates to provide a uniform durable surface.



ANOTHER Low-cost WAREHOUSE USING MONOCORD TRUSSES

Assembled and ready for erection are several of 28 Monocord Timber Trusses fabricated by Weyerhaeuser and furnished by Wallis Lumber Company for the 220' x 112' Del Monte products warehouse in Crystal City, Texas.

The market for wide-span, post-free buildings for commercial, industrial, farm and public uses is continually expanding.

You can obtain sound, economical framing members for this class of structure from the broad Weyerhaeuser line of structural wood products... many types of roof trusses in varying spans: trussed rafters; segmental arched rafters in 30 to 60 foot spans; buttressed arches for 50 to 100 foot spans; girders and other structural members. Only properly stress-graded lumber is used in fabrication.

Strong, durable members are delivered to your

job site complete with hardware, ready for easy assembly and erection by local crews.

Write for the Structural Wood Products Catalog, and contact your local Weyerhaeuser 4-Square Lumber Dealer or us for specific information.

Address nearest Office or Representative:

Billings, Montana	Denver, Colorado	Salt Lake City, Utah	Phoenix, Arizona
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WEYERHAEUSER SALES COMPANY

SEATTLE • TACOMA • SPOKANE • WALLA WALLA • SAN FRANCISCO • LOS ANGELES

low "Cranes - on - Rubber" Got Their Start

Back in 1918, General Pershing asked for 125 mobile cranes on truck chassis to work on the docks in France to speed up the handling of war material. But, World War I ended before such cranes were available. However, A. Smythe, then President of The Thew Shovel Co. in Lorain, Ohio, developed the idea and, late in 1918, the Universal Crane Co., a subsidiary of Thew, marketed the first so-called "Truck Crane".



The first truck crane — 1918 model

In the years that followed, much happened to "truck cranes". They became accepted tools of the construction industry, capacities increased, booms became longer, and finally exceeded the capabilities of the commercial truck chassis as mountings. These were replaced with a heavy-duty carrier especially designed for the live, highly-concentrated loads of shovel-crane use. The first such carrier, on which was mounted a Lorain turntable, was the Lorain Moto-Crane, developed and produced by Thew in 1940. Thew Shovel Co. still designs and builds Moto-Cranes in their own plants.

The first Universal Truck Crane had a lifting capacity of 3 tons with a maximum boom of 20 ft. Today, Moto-Cranes are made in a variety of capacities from 6 to 45 tons, with highway speeds up to 33 m.p.h. Rear axles mounted on rocker beams, air steer, large dual wheels, ample tractive effort and the availability of front end drive make them exceptionally efficient for off-the-road travel over soft and rough ground.



World's largest crane on rubber today

While the trade-marked name for the Lorain 2-engine rubber-tire machine is "Moto-Crane", it has been many years since their use has been limited to lifting crane service only. Front ends are also available for shovel, dragline, clamshell, hoe and scoop shovel use as well.

2 NEW

MOTO-CRANE® MODELS BY LORAIN

LORAIN MODEL MC-424

2 gasoline engines (1 on turntable, 1 on carrier); available as shovel, crane, dragline, clamshell and hoe; 96" over-all width; 10 forward speeds (up to 27 m.p.h.), 2 reverse speeds; air brakes; maximum boom with tip - 125 ft. May be had with diesel power for turntable, third drum, power load lowering, front wheel brakes and many other accessories.



Also available as a companion single-engine Self-Propelled machine — Model SP-424

22½ TONS

LORAIN-TL MODEL MC-254W

Available as ¾-yd. shovel, crane, dragline, clamshell, hoe or 1¼ cu. yd. scoop shovel. 106" over-all width; 8 forward speeds (up to 37 m.p.h.), 2 reverse speeds; air brakes; maximum boom length with tip is 95 ft. May be had with diesel power for turntable and carrier, with front driving axle, third drum and other accessories.



Also available as a companion single-engine Self-Propelled machine — Model SP-254W

17½ TONS

Now you can have even greater selection from the Lorain line of products with the addition of these 4 new Moto-Crane and Self-Propelled models. Thew-Lorain is now better prepared than ever to serve *all* your shovel-crane needs — whether on rubber tires or crawlers. See your Lorain distributor for the full Lorain story.

THEW LORAIN®

THE THEW SHOVEL CO., LORAIN, OHIO

ANDREWS EQUIPMENT SERVICE
OF WASHINGTON, INC.

Spokane, Wash.

CENTRAL MACHINERY CO.
Great Falls, Havre and Lewistown, Mont.

COAST EQUIPMENT CO.
San Francisco 3, California

J. D. COGGINS CO.
1717 No. 2nd, Albuquerque, New Mexico

A. H. COX & COMPANY
Seattle 4, Tacoma & Wenatchee, Wash.

P. L. CROOKS & CO., INC.
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GENERAL EQUIPMENT CO.
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MCCOY COMPANY

Denver 17, Colo. Branches: Sterling, Alamosa & Grand Junction, Colo.

MOUNTAIN TRACTOR CO.

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H. H. NIELSEN COMPANY

Salt Lake City, Utah

LEE REDMAN EQUIPMENT CO.

Phoenix, Arizona

SOUTHERN IDAHO EQUIPMENT CO.

Idaho Falls, Boise and Twin Falls, Idaho

TRACTOR & EQUIPMENT CO.

Sidney, Mont. Branches: Miles City, Glasgow, Mont.

YUKON EQUIPMENT CO. (for Alaska)

Seattle, Wash. Branches at Fairbanks and Anchorage, Alaska

Planning for profits: Theme of Region 11 AED meeting

Two full days of business sessions and a little golf when the fog lifted were the features of the AED Region 11 annual meeting held at Pebble Beach, California, October 8-10. Beal Shaw, regional director, administered a tight program schedule which saw the principal speaker, Dr. Charles Reitell of Stevenson, Jordan & Harrison spread his two-hour presentation over both days and answer a lot of questions afterwards.

Dr. Reitell's illustrated lecture was drawn from the manual "Planning for Greater Profits," a book of recommended practices that has resulted from the author's survey of AED member firms. Stressing the point that his procedures do not involve changes in accounting practice, Dr. Reitell showed instead that they are matters of interpretation of existing accounts that permit more realistic control. Attention to sales volume alone is not enough, he said. The wise

distributor also evaluates sales costs—for each of his operating divisions—in order to determine relative "profit power." Reitell finds the usual conception of gross profit an inadequate performance measure, though admitting that it may be of use to the individual firm. (And usefulness of an accounting practice is the measure of its worth.)

In Reitell's book, profit planning requires allocation of all possible costs against individual sales lines. Residual revenue from sales then is termed "available"—available for payment of indirect costs and profits. A graphic system derived from Reitell's studies permits quick derivation of break-even point and evaluation of the "power" of a line to produce profits.

The Pebble Beach gathering was not the only one to hear this summary of the new AED-commissioned manual. Dr. Reitell has visited others in

the country, and proceeded northward from California to repeat his topic before distributors of AED Region 12 convening at Gearhart, Oregon, the following week.

Also appearing before both meetings was John Oechsle, national president of AED, who commended the group for its apparently high plane of practice. He added, with a chuckle, that perhaps things appear better here in the West because the throats to be cut are so much farther apart.

Individual concern with a softening equipment market was dispelled, partly by various program speakers and partly by members in participation from the floor. Mention was made of continuing advances by civil engineers in their technical practice, which force equipment changes upon manufacturers, thereby adding to the markets for equipment distributors. Jack Randle, field secretary of AED, emphasized the backlog that faces the construction industry, noting that today's apparent leveling off of activity is unique when there is so much to be done. The conclusion can only be that this plateau of activity will extend for several years if, indeed, it does not give way to further rise.

Most within the grasp of each AED member in maintaining and improving his business are management procedures such as those discussed by Dr. Reitell and also by John Louth, of McKinsey & Co., management consultants. Louth's prepared speech "Meeting Competition Is Not Enough," summarized possibilities in the matters of selecting and training salesmen, establishing control reports, setting up salesmen's compensation plans, and merchandising field selling efforts. The implied emphasis of Louth's speech on salesmen themselves prompted a general realization by AED members present that a key to the future lies in recovery of the aggressive, controlled sales effort that has been absent since before World War II.

Other major subjects, in the conference room, in the bar, and in the lounge, were equipment financing measures, practices in price cutting and management concepts of what constitutes the best salesmen's compensation plans.

New lines for West Coast Engine

M. C. Wright, president of West Coast Engine & Equipment Co., Berkeley, Calif., announces that the firm has been appointed distributor for Davey Compressor Co., American Tractor Corp., and Lessman Loader Co.

Pioneer appoints Colorado rep

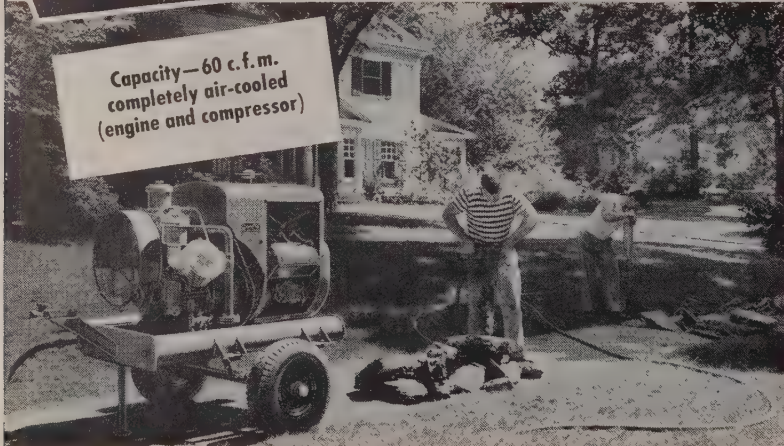
The Colorado Builders' Supply Co., Denver, has been appointed a distributor for Pioneer Engineering Works, Inc. This well-known distributor will handle the complete line of Pioneer equipment in the state of Colorado; in Wyoming except the

DAVEY

Super Chief

... the lightweight champion
with the heavy-duty work punch!

Capacity—60 c. f. m.
completely air-cooled
(engine and compressor)



● Here, for the first time, is an economically-priced, lightweight compressor (1250 lbs.) that is designed for constant, heavy-duty service. ● Features include clutch between engine and compressor, full force feed lubrication, built-in unloader system, air receiver integral with frame . . . highest speed chassis and tow bar ever placed on a compressor. ● Like the famous bigger Daveys, the Super Chief has **PERMANENT PEAK EFFICIENCY VALVES**. These never carbon or foul. They guarantee the utmost in operating satisfaction, low cost operation and long compressor life. ● DAVEY COMPRESSOR CO. ● KENT, OHIO

DAVEY

Pioneers of
Air-Cooled Air

A-6784

counties of Teton, Lincoln and Uinta; and all of Nebraska west of and including the counties of Sheridan, Garden and Deuel.

The company was also named distributor for the Euclid Road Machinery Co. in Colorado, most of Wyoming and part of Nebraska.

Westinghouse names welding distributor

Pacific Metals Co., Ltd., San Francisco, has been appointed welding distributor for Westinghouse Electric Corp., and will sell the complete line of Westinghouse welding equipment, electrodes and supplies in California, Nevada, Utah, Arizona and southern Idaho.

Mack Motor Northwest expansion

Mack Motor Truck Corp. has begun construction of a 30,000-sq. ft. reinforced concrete structure at 3707 Airport Way in Seattle that will greatly expand the firm's truck sales and repair facilities in the Northwest states. According to J. C. Rowold, vice president of the company, the new \$250,000 building will present a number of outstanding "firsts" in design that will permit unusually fast servicing of trucks of all sizes and types. E. A. May, district manager for the states of Washington, Montana and Idaho, will have his headquarters in the new building. An outstanding feature of the new facilities will be a parts room with metal bins

fitted with special lights to aid in rapid identification of parts, and enough storage space for a complete stock of parts for Mack's trucks in the entire Northwest area. Overhead garage doors operated electrically are 20 ft. wide and more than 14 ft. high to admit the largest trucks. Complete repair facilities will be provided. The building is on a 62,000-sq. ft. tract, with a large storage area paved with asphaltic concrete.

Schild Bantam appoints Otterness NW dist. mgr.

R. A. (Bob) Otterness is appointed Northwest district manager for the Schild Bantam Co., making his headquarters in Spokane, Wash. He joins



R. A. Otterness
Schild Bantam's
new NW district
manager

Schild Bantam after 15 years experience as a district manager for Lima, seven of those years in the Northwest. During the past two years, he was sales manager for a New Mexico construction machinery distributor.

New branch for Sprague & Henwood

Sprague & Henwood, Inc., diamond drilling contractors and manufacturers, has opened a new branch office at Grand Junction, Colo. Robert R. Carver is appointed manager of the new facility which is known as the "Western Branch." He has been associated with the company for the past six years and the last year was assistant manager of the contract department, located at the head office in Scranton, Pa. As manager of the Western Branch, Carver is fully in charge of several large contracts held by the company in this area.

ESCO transfers Weeks

Roy C. Weeks, sales engineer for Electric Steel Foundry Co., Portland, has been transferred to ESCO's Medford branch where he will head sales of power transmission, logging, sawmill and construction equipment. Weeks replaces Ralph E. Filsinger who has taken up new duties in the production control department at Portland. From the Medford branch, Weeks will service southern Oregon and northern California.

So. Calif. Equipment Co. merges with Cook Bros.

J. E. Hall, vice president, Cook Bros. Equipment Co., announces that Southern California Equipment Co., a Cook Bros. subsidiary, has merged with the parent company. All P&H products previously distributed by

Are YOU trying to push water through LINES LIKE THIS?

No need to worry about it anymore!

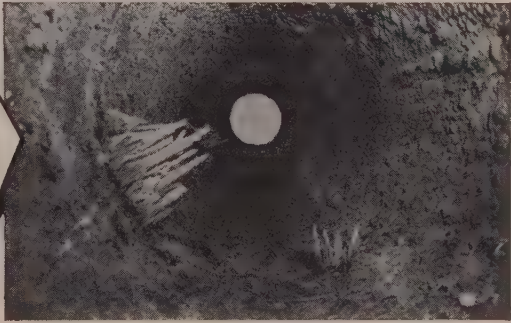
You can recondition your old cast iron or steel line very economically...at much less than the cost of a new pipe line.

AND...without appreciably disturbing present service!

Interior tuberculation and incrustation is removed by patented processes used by

PIPE LININGS, INC....and a new, continuous, smooth surface cement mortar lining is applied...with only momentary interruption to install by-pass lines.

If your lines look like this...find out how you can get new pipe performance at much less than the cost of new line. Write TODAY!



CEMENT MORTAR LINING WILL...

- Protect against discoloration and contamination
- Protect against corrosion
- Improve flow coefficients
- Prevent leakage
- Reduce maintenance costs
- Reduce pumping costs



After reconditioning

TATE PROCESS USED
on Line 4" to 16"
CENTRILINE PROCESS
Used on Line 16" to 144"
Consult our hydraulic engineers...they are at your service.

PIPE LININGS, Inc.

A subsidiary of
American Pipe and Construction Co.
4675 Firestone Blvd.
South Gate, California

PIPE LININGS, INC.
4675 Firestone Blvd., South Gate, Calif.
Please send complete information on how we can obtain new pipe line performance from our old line.

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

Southern California will be sold and leased through Cook Bros. In addition to P&H products the firm will continue to handle Challenge truck mixers, C. S. Johnson batch plants, and their own complete line of truck equipment. This merger is in line with Cook Bros. recent modernization program with enlarged manufacturing and service facilities, making it advisable to combine both operations where better, more efficient service is available to the customer. Dick Sommers, Ed Farewell and Bill Bush, formerly with the subsidiary firm, will continue with Cook Bros.

AED "Green Book" 6th edition available

The "Sixth Edition Compilation of Rental Rates for Construction Equipment" published by the Associated Equipment Distributors is now ready for mailing. The Sixth Edition, commonly referred to as the "Green Book," is said to be the most useful publication of its kind ever offered to the construction industry, surpassing the 1950 edition. It contains over 80 pages of listings, with some 2,000 items of construction equipment and illustrations. As a source of general information, the rental rates appearing in the 1953 compilation reflect the results of a recent 90-day nationwide survey by AED among its 700 U. S. distributor members. (The rates do not, however, represent rentals actually charged by renters in any particular section of the country, the publication being purely a statistical report of composite rates derived from the survey.) The book sells for \$5.00 per copy and may be obtained by writing the Associated Equipment Distributors, 30 East Cedar St., Chicago 11, Ill.

NEWS OF MANUFACTURERS

Two Koehring transfers

Two transfers in the sales departments of Koehring Company and one of its subsidiaries, Parsons Company, are announced. R. E. Bansemer, assistant sales manager at Koehring becomes sales manager for Parsons and M. O. Messenger, sales manager at the Parson plant at Newton, Iowa, has moved to Milwaukee to take over the assistant sales manager's duties in the parent company.

Universal Conc. Pipe becomes American-Marietta subsidiary

American-Marietta Co. has acquired controlling interest in the Universal Concrete Pipe Co. Harry J. Hemingway, president of American-Marietta, is Universal's new president. H. X. Eschenbrenner, founder, remains with the company in a consulting capacity. H. E. Eschenbrenner, J. C. Merritt and T. H. Monaghan of Universal have been elected vice presidents.

Gunderson-Taylor expansion

Gunderson-Taylor Machinery Co. has moved to new and larger quarters at 1201-1237 Shoshone St., Denver, Colo., reflecting a steady growth of the business since the company was incorporated in 1946. The original building had only 1,500 sq. ft., as contrasted to 17,000 sq. ft. in the new location. The company is headed by G. W. Gunderson, former sales manager of Gardner-Denver. His partner, Edward Taylor, has long been a well-known figure in the construction machinery field.

Harnischfeger personnel changes

Harnischfeger Corp. announces the appointment of J. F. Catalane as sales manager of the P&H Small Excavator Division, succeeding F. C. Edwards, recently appointed general manager of the P&H Diesel Division.

Concurrent with Catalane's appointment, Robert P. Jones assumes the duties of assistant sales manager of the Small Excavator Division.

Wm. Rodgers elected Blaw-Knox v.p. and g.s.m.

William Rodgers has been elected vice president and general sales manager of Blaw-Knox Co. He joined the company April 1 in the new staff post of general sales manager after many years experience in the construction materials business and the motor transport field.

Nelson of Gar Wood killed

H. N. (Scoop) Nelson, 43, assistant sales manager, Findlay Division, Gar Wood Industries, was killed Sept. 29 in an automobile accident in Moorhead, Minn. Well known as "Scoop" throughout the construction industry, Nelson spent more than 20 years in the sales and service of heavy construction equipment.

Fryer retires from Columbia-Geneva Steel

Herbert E. Fryer, manager of sales of the Columbia-Geneva Steel Division's Denver office since 1934, has retired from active service with the company. He has been associated with U. S. Steel's sales organization for 46 years and is widely known throughout the West. His business career started in 1907 as a clerk in the Denver sales office of the former Carnegie Steel Co. Before his appointment as manager of sales he had held positions in New York, El Paso, Texas, and Salt Lake City, Utah.

Superior changes name

The adoption of a new name, Superior Scaffold Co., to replace the former name of Superior Scaffolding Co., is announced by Robert K. (Bob) Squire, president of the Culver City, Calif., company. Still in effect is the manufacturing franchise held by Edmond F. Venzie, head of National Plaster Block Co. of Philadelphia, under which National will continue to handle manufacturing and sales of

HANGAR SHOP STORAGE SPACE

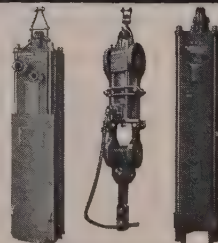
90,000 SQ. FT. OF HANGAR, SHOP AREA, 72,320 SQ. FT. OF STORAGE, BARRACKS. LOCATED AT RYAN FIELD, 13 MILES SW

TUCSON

WRITE, WIRE OR CALL BOB SCHMIDT, TUCSON AIRPORT AUTHORITY, MUNICIPAL AIRPORT, P. O. BOX 1191, TUCSON, ARIZONA — PHONE 39372

All or Part — Excellent Deal to Established Individuals or Concerns — Principals Only.

McKIERNAN-TERRY wide-range line of PILE HAMMERS and EXTRACTORS



Now made in complete standardized line of eleven double-acting hammers, five single-acting hammers and two double-acting extractors. Write for free descriptive Bulletins.

Also builders of coal and ore bridges, bulk material unloaders, bridge operating mechanisms, hoists and marine equipment, and specially designed machinery.

McKIERNAN-TERRY CORPORATION
MANUFACTURING ENGINEERS • 16 PARK ROW, NEW YORK 38, N. Y.

HK-347A

Superior Scaffold items east of the Mississippi, while Superior Scaffold Co. serves the Western region in a like capacity.

Chain Belt changes

Several new appointments are announced by Chain Belt Co. Two executive changes involve J. C. Merz who has been elected to the position of chairman of the board of directors and L. B. McKnight who succeeds him as president and chief executive officer of the company. A. R. Abelt is appointed vice president—sales. George W. Woodland is appointed to the newly-created position of manager of field forces, industrial divisions. Gilbert J. Schuelke is now sales manager of the Chain and Transmission Division. W. C. Messinger is made assistant to A. K. Thomas, divisional manager of Chain Belt's Construction Machinery Division. R. V. Krikorian is appointed to succeed to Messinger's former position as manager of the Ordnance Division.

Recently announced also is that Chain Belt has purchased the Shafer Bearing Corp. for the purpose of broadening the markets for its power transmission products. The new addition will operate as the Shafer Bearing Division of Chain Belt Co. No change is made in the management responsibility. R. P. Tennes, former president, becomes division manager; M. J. Tennes, Jr., factory manager; H. E. Tennes, sales manager; A. H. Williams, chief engineer; H. R. Lucas, controller, and Gordon Terris, director of distributor sales.

Hercules promotions

Appointments of Jack D. Hayes, Jr., as director of operations, and Clarence W. Ballard as director of sales, for the explosives department of Hercules Powder Co. are announced by John M. Martin department general manager. Hayes succeeds Harry V. Chase and Ballard succeeds LeRoy Keane, both of whom became assistant general managers of the explosives department.

New International Harvester sales unit

Establishment of a new Industrial Power Division sales department by International Harvester Co. and the appointment of I. P. Payne as manager of the new sales department are announced through H. T. Reishus, vice president, Industrial Power Division. Assisting Payne will be W. M. Holland and C. E. Jones.

Pettibone-Mulliken expansion

Continuing its expansion and diversification in the road building and material handling and processing fields, Pettibone-Mulliken Corp. has acquired the assets of Wood Manufacturing Co., North Hollywood, Calif. E. J. Seifert, Pettibone presi-

You can't afford to be without a Dotmar Paver IF YOU:



It's Actually 3 Machines In 1!

Contractors everywhere are boosting production, saving time, cutting costs, with Dotmar Curb and Gutter Pavers. Paves 5 to 10 lineal ft. per min. Lays any shape curb and gutter, and sidewalks up to 60" wide, or integral, curb, gutter and sidewalk simultaneously. Tamps concrete ahead of screed. Pays for itself in first mile of curb and gutter paved. No face forms to set in curb work. Self-powered—as few as 3 men can operate. Send for Bulletin

Dotmar INDUSTRIES Inc.

518 HANSELMAN BUILDING, KALAMAZOO, MICHIGAN

HAVE YOU
SEEN
THIS ONE
IN
ACTION?



DUAL-COMPRESSION TRENCH ROLLER

In effect — it's two rollers in one!

It can be used as illustrated here—with the two compression rolls slightly overlapping—for an effective 39" rolling width. Or, it can be used with the two rolls trailing each other, giving the effect of two 20" rolls in a single pass. The ingenious design permits setting the rolls at any intermediate position, too, for a compression range of 20" to 39" in width.

Think of the economy! Think of the edge you have on competition. One operator and one machine doing the work of two!

Send for complete specifications!

ALL PURPOSE SPREADER CO. Elyria, Ohio U.S.A.

ALLIGATOR V-BELT DRIVES

... you can make
up all lengths of
V-Belts quickly



"B"
DISPLAY
UNIT

- ★ Units contain V-Belting, Fasteners and Tools — everything you need in one package for all emergencies when correct endless V-belt is not available.
- ★ Avoid costly delays, shut-downs and pickups.
- ★ Eliminates costly dismantling of machinery when re-belting.
- ★ Completely modern make-up units that give you peace of mind as well as stock on hand.
- ★ Less Stretch and Follow-Up Maintenance. Just One Strong Joint.
- ★ Alligator V-Belt Drive Units, available in sizes A, B, C and D. B size furnished in display box.
- ★ Order from your distributor. Ask for Bulletin V-215.

FLEXIBLE STEEL LACING CO.

4704 Lexington St., Chicago 44, Ill.

dent, announces the formation of a new corporation, the Pettibone Wood Mfg. Co., a wholly-owned subsidiary, which will continue at the same location with the same personnel. The Wood Company manufactures Wood Roadmixers for asphalt and soil-cement stabilization work and Wood Preparizers for rehabilitating asphalt roads.

Universal builds its first West Coast plant

H. X. Eschenbrenner, president of Universal Concrete Pipe Co., announces the building of its first West Coast plant at 5555 Irwindale Ave., Azusa, Calif. Henry A. Weigand is manager of the new plant and Chris Adzovich production manager. In making the announcement, Eschenbrenner said, "This new operation will enable us to serve engineers, contractors, builders and municipalities in the West just as we have been serving eastern and southern builders for over 25 years."

Paul Nast made Davey division mgr.

Appointment of Paul H. Nast as manager of the rock drill division, Davey Compressor Co., Kent, Ohio, is announced by Paul H. Davey, president. He is one of the best known executives in the air tool industry. Prior to joining Davey, he had been associated with The Worthington Corp.,

Chicago Pneumatic Tool Co., and Sullivan Machinery Co. In his new post, Nast will be in charge of sales, engineering and manufacture of the complete Davey air tool line.

News at Heil

W. A. (Mike) Carlson, sales manager of the Body and Hoist Division, The Heil Co., has appointed H. J. Row as sales promotion manager of his department. He will act as coordinator on promotional matters between the Body and Hoist Division and Heil distributors.

Associated Wood Products moves

Associated Wood Products of the Northwest, designers and fabricators of wood structural members, moved its entire plant and executive personnel into a new plant recently. According to J. D. (Jack) Godfrey, president, the new plant, located at 6803 S.E. Johnson Creek Blvd., Portland, will improve the company's present facilities for both production and delivery.

Asphalt paving technologist dies

Francis L. Mark, widely known asphalt paving technologist and manager of the Asphalt Products Department of Dewey & Almy Chemical Co. died recently at the age of 56. He was an expert in the development and use of additives for improving asphalt paving. A member of Com-

WISCONSIN- POWERED BUCK HOIST

Lifts 20 Cubic Yards per Hour

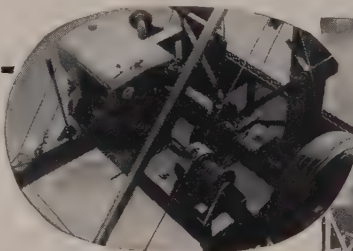
Here's another typical Wisconsin Heavy-Duty Air-Cooled Engine construction application . . . hoisting concrete for the new Chemistry Building at Xavier University, Cincinnati, O. A Model TE 2-cylinder Wisconsin Air-Cooled Power Unit handles the load, delivering up to 20 cu. yds. of concrete per hr. with a ½ yd. self-dumping bucket (dumping here at the 56 ft. level).

In addition, the tower is self-erecting up to 40 ft. according to the manufacturer, Buck Equipment Corporation, Cincinnati 2, Ohio.

The construction contractor reports that the rig works equally well bringing up bricks, cut stone, reinforcing rods, steel beams and other materials. All of which calls for HEAVY-DUTY DEPENDABILITY from the Power Unit.

Wisconsin Engine features such as tapered roller bearings at both ends of the crankshaft, gear-driven high tension outside magneto, positive AIR-COOLING and lubrication contribute to all-around dependability and peak performance, day-in and day-out.

You can't go wrong when you specify Wisconsin Air-Cooled Engine Power for your equipment.



Power
TO FIT THE
JOB

Power
TO FIT THE
MACHINE



WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

A 7582-3/8-A

mittee D4 of the ASTM, and chairman of one of its subcommittees, Mark was also a member of the National Highway Research Board, The Asphalt Institute and Association of Asphalt Paving Technologists.

New division mgr. for Gar Wood

Mark L. Shepard was recently made manager of the Richmond Division of Gar Wood Industries, Inc., Richmond, Calif., according to company president E. F. Fisher. He succeeds J. B. Steed, who reports to Gar Wood's executive offices in Wayne, Mich. In his new position, Shepard will direct the sales and manufacturing activities at the Richmond Division, which include hydraulic hoists and dump bodies, side dump rock bodies, Hi-Lift loaders, truck winches, pole derricks, truck cranes and Load-Packer compacting refuse bodies.

New asphalt refinery for American Bitumuls

American Bitumuls & Asphalt Co., San Francisco, announces plans for construction of a \$4,000,000 asphalt refinery near Cincinnati, Ohio. C. W. Turner, president of the company, said the new refinery will be especially designed for the refining of asphalt products and the manufacture of all standard grades of asphaltic products used by the paving



HERE is the architect's sketch of the new Alloy Rods Company plant located in El Segundo in a new industrial area now being developed by the Santa Fe Railroad near the Los Angeles International Airport. Under construction during the summer months and expected to be in full operation now, this plant will be supervised by George M. Hohmann, formerly production manager of the York, Pa., plant. E. J. Brady, president of the company, announced that the York plant is now being enlarged to double existing production facilities. The El Segundo plant is designated the Pacific Coast Division of the Alloy Rods Company and will produce a complete line of alloy arc welding electrodes to serve the entire Pacific Coast and Rocky Mountain states.

industry for roads, streets and airports, and for bituminous maintenance of all kinds. The area to be served will include Ohio, Indiana, Kentucky and Michigan.

Calaveras ups Doane

Calaveras Cement Co. announces the appointment of John E. Doane as assistant sales manager, serving under Mel J. London, vice president and general sales manager. In his

new capacity, Doane also will retain his former duties of traffic manager.

Truscon appointment

A. L. Munsell is appointed manager of sales, dealer commodity products, of the Truscon Steel Division, Republic Steel Corp., with headquarters in Youngstown, Ohio. Until this present assignment he was assistant manager of sales, steel window and screen products.



- ✓ For joining grader, trencher, ditcher and other earth moving conveyor belts.
- ✓ For belts $\frac{3}{8}$ " to $\frac{1}{2}$ " thick.
- ✓ A FLEXCO fastener that is HINGED. Has removable hinge pin.
- ✓ Troughs naturally, operates through take-up pulleys.
- ✓ Strong, durable . . . pull or tension is distributed uniformly across joint.

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FLEXIBLE STEEL LACING CO
4704 Lexington St., Chicago 44, Ill.



New "ECO-TEMP" Portable Heating Unit...Uses L-P Gas...Has Automatic Firing

Instant, safe, clean heat—up to 500,000 BTU's—is provided by the new "ECO-TEMP" LP Gas Portable Heating Unit with automatic firing. Gas tanks store fuel on the job, with hose connection to heater. Just plug-in and turn the valve. The unit goes instantly into operation, with quick rise to temperature and wide-coverage heat that has no smoke or odor. Can be furnished with durable flame-proof vinyl coated canvas heat duct, for spot heating.

Available in three regular sizes—140,000 BTU's, 250,000 BTU's and 500,000 BTU's—for all ordinary heating-drying-thawing operations; and in two super-sizes—650,000 BTU's and 950,000 BTU's—for exceptionally heavy duty, including crop drying. Built to provide superior strength, durability and safety, assuring long, reliable service with minimum maintenance. Write for complete information and prices.

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CABLEWAYS
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ELECTRIC, STEAM or DIESEL
CAPACITY 5 to 20 TONS
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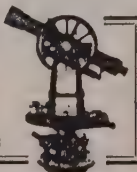


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FLOOD SAFETY
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all absorbent materials. Sold 14 years. Quick, economical,
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Graduate engineers with re-
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steam power plants or related
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the mechanical, electrical or
civil-structural phase of a ma-
jor construction project.

Please write giving complete
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Structural, mechanical, and elec-
trical for work on hydro-electric
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tractor, main office Los Angeles, has
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Estimator experienced in commer-
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work. Prepare for the top jobs. Send post
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FOR SALE STEEL SHEET PILING NEAR BREWSTER, WASHINGTON

Shipped New — Used Only One Job

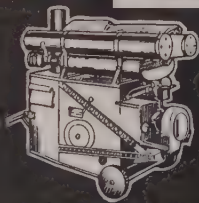
Carnegie	MP-101	MP-102	Tees
Length	Pcs.	Pcs.	Pcs.
72-65 ft.	105	100	2
65-60 ft.	210	50	9
60-50 ft.	210	5	18
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Also quantity 35 ft. and shorter—Quick Shipment
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108 FEET OF DUCTS INCLUDED!

250,000 B.T.U. PORTABLE
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Herman Nelson portable,
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1 1/2 h.p. air-cooled, ball bearing
engine. 108 ft. of flexible,
flameproof, waterproof ducts.

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HEATING buildings under construction,
shops, sheds, warehouses, barns,
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DRYING concrete, plaster, mortar, paint,
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PRE-HEATING engines, tractors, trucks,
freight cars, equipment.

THAWING machinery, freight cars, tanks,
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Your Heater can be shipped within 1 hour.

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References: Dun & Bradstreet, Pueblo Savings & Trust Co.
175-1511 So. Santa Fe Phone 11704 Pueblo, Colo.

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...at far lower cost than new tires!



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Marvin Doepner, above, is a specialist in off-the-road tires — new and re-capped. He is at your service, in the field, throughout the eleven Western states! Ask Wheeler to send Mr. Doepner to your job.



You save at least 50% of cost of new tires . . . and get equal hours of **ADDITIONAL SERVICE** . . . Order the **HAWKINSON** system of tire re-treading through **WHEELER'S**, at Salt Lake City.



We guarantee to produce as many hours of service on your heavy-duty, off-highway tires as original tread hours!

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Greater Safety — Less Weight to Handle
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AIR COMPRESSORS—686 CFM

Three (3) Gardner-Denver Model WBJ 4100
stationary two-stage water-cooled compressors,
powered by Caterpillar D-17000 Diesel en-
gines, 8-S series. Excellent condition. Skid
mounted, V-belt drive, 686 CFM air each.
Write, phone or wire for further details.
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MOORE EQUIPMENT CO., Inc.

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Do YOU Want—

- to find a job?
- to get good help?
- to sell or rent good used equipment?
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Use WC Classified
Pages for ACTION!

P. G. & E. reports progress on Pit 4 project

PACIFIC Gas & Electric Co. has reported two mileposts in construction of its Pit 4 project in Shasta County, Calif., (see *Western Construction*—September 1953, p. 82-84). First concrete pour for powerhouse foundations was made in the middle of September, followed by the holing through at the upstream end of the 4-mi. diversion tunnel. The completed section of the tunnel runs 2,097 ft. from an entrance or "adit" cut last June. At that date tunnel crews of Walsh Construction Co. had driven 9,932 ft. of 23-ft. tunnel and had 11,385 ft. to go through hard, broken volcanic rock which requires timbering all the way. The crews that pushed to daylight on the upstream end now are turning downstream and will meet underground with crews driving upstream from the outlet portal above the powerhouse.

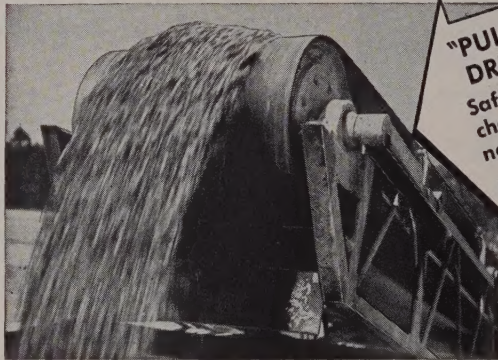
"Not mineral," says judge on sand and gravel

UP NORTH in Alaska four families got together three years ago and made a claim on territorial school lands near Anchorage because they had discovered gravel in the area. Two companies also staked mining claims on the land, the value of which is estimated at \$2,000,000, including the \$750,000 worth of gravel. But Judge George W. Folta dismissed the suits by the three companies, denying that sand and gravel are minerals and that

someone can "discover" something which is in plain view. And so the ruling will stand throughout the United States and its territories unless the judge's decision is overruled by a superior court. Folta expressed a belief that Congress made the discovery rule, which he upheld, in enacting mining laws with the intention of limiting appropriation of public land yet stimulating the prospector by rewarding his efforts. "In a traditional sense," he said, "it is difficult to conceive of a discovery (without) great hardship, effort and expense."

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For Belt Conveyors and Bucket Elevators



**"PULLEY WITH THE
DRIVE INSIDE"**
Safe, compact, simple . . . no
chains, no belts, no sprockets,
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Built by YUBA for sale in
Arizona, California, Idaho,
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Pulley shell of this revolution-
ary head pulley rotates around
electric motor and reduction
gears, which are held station-
ary by torque arm attached to
conveyor frame. Quickly in-

stalled — requires no more
room than idler pulley. All
moving parts protected against
weather, grit, dirt. Diameters
16" to 48". 5 to 75 hp. for
voltages to 2300. Job proved.

Write TODAY for folder and name of nearest distributor.



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Pulley and Sprocket Dept.

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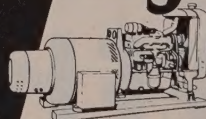
Benicia, Calif.

52

KATO-light

**LIGHT
and POWER
PLANTS**

- EMERGENCY POWER for power failures
- PORTABLE POWER for power or light anywhere
- CONTINUOUS POWER where there is no power line



500 to 40,000 WATTS
AIR AND WATER-COOLED

Powered by Wisconsin,
Briggs & Stratton, Chrysler
and other popular engines.
Service and parts avail-
able everywhere.

KATOlight, a name long and favorably known in the small power unit field, is now introduced on the West Coast by King-Knight Co. who for many years has been a custom builder of engine-generator units in the larger sizes.

Call or write for Bulletin No. 653.

KING-KNIGHT COMPANY

MECHANICAL AND ELECTRICAL ENGINEERS
360 Jefferson Street • San Francisco 11 • Prospect 6-2700
ENGINE-GENERATORS from 1/2 to 600 kw.
PUMPING UNITS—AUTOMATIC CONTROL EQUIPMENT

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Johnston Stainless Welding Rods

Practical, Down-to-Earth Welding Rods
Alloys as they are supposed to be

Corrosion Resistant—
Clean metal

Strong—
Low in cracking

A. P. JOHNSTON CO.
1845 E. 57th St., Los Angeles 58

BACKFILL, uncompacted

"Really the frontier"

We weren't able to see the Alcan Project first-hand, as we usually like to do when a project has so many noteworthy features. But you will be fully informed about the work just the same—in a series of four articles, the first beginning on page 66 of this issue.

For our part, though, we're getting a pretty good idea why the project area is called a wilderness, and how the topographic and weather conditions have made the job something more than an ordinary challenge to construction men. One thing is that we have had nearly 60 pictures available with which to illustrate the articles.

And, in addition, we received a letter not long ago from J. P. Cullen, West Coast manager for Blaw-Knox, who had just returned from a project tour. (Blaw-Knox has a substantial volume of business there for tunnel and curb forms.) His comments gave us a lasting impression of the area, and we'd like to pass them along. So, for the rest of this item, he's talking.

"This is really the frontier: snow-capped, cloud-covered mountains, and fogbound peaks and valleys that come at you like smoke from a forest fire under a high wind as you travel by plane. In our 9-passenger single-engine pontoon plane we climbed to 7,500 ft. trying to clear the mountains, but then the fog became so thick and the danger so great that we scooted down into a gorge and skimmed over water at about 600 ft. Then a cloud comes your way making even that impenetrable and you change your course down another valley to follow another channel. Eventually you hit a clearing and start to climb to pass over another peak. It is a continuous repetition for 400 mi. to Kemano from Vancouver.

"Trees had to be cleared to build gravel roads to bring in the machinery, which is first brought by barges towed by tugs from Vancouver. There is a tide rising up to 24 ft., so they bring the barges in at high tide, and when the tide goes out they are resting on the bottom of the inlet. The snows from the mountain ranges go into several lakes, and these all overflow into Nechako River, where the course of the river is actually being changed by Kenney Dam. Water from the dam's reservoir will be diverted through a 10-mi. tunnel, driven through 100% hard rock, and then drop 2,580 ft. or 16 times the height of Niagara Falls...

"The generating station... is set back, not as we thought under the cliffs of the mountain, but actually

inside the mountain like an amphitheatre. M-K drove a tunnel 1,500 ft. to start to whittle out the space for the station, which is 100 ft. high, 80 ft. wide, and more than 700 ft. long. First, the tunnel was cut to permit excavation for the dome, and then another tunnel was driven approximately 80 ft. below, where they could get trucks in to catch the broken rock which is shot down to them through a vertical well from the top.

"We entered here at night under the guidance of Ramon Reed, the area engineer, and his assistant, James Libby. Next day we traveled some 12 mi. up to the base of the mountain where a road is being built over glacial peaks. The only kind of motorized units able to make the

Twenty-five years ago in Western Construction

"Sixteen engineering firms submitted proposals to the board of supervisors of Multnomah County, Oregon, for the design and construction of the St. John highway bridge across the Willamette river, at Portland."

* * *

"By six million plurality and an overwhelming electoral vote, Herbert Hoover was elected President of the United States of America. Within two days following election, the stock market boomed, and rumors of prosperity and construction activity began to spread all over the country."

* * *

"The Utah Construction Co. continues making good progress on the Gibson Dam, Sun River Reclamation Project [Montana], a total of 16,000 cu. yd. of concrete having been poured in August, and 19,600 cu. yd. during September, making a total in place of 101,000 cu. yd., and 59,000 cu. yd. remaining to be poured."

* * *

The Model "O" Skilsaw was announced: a 24-lb. portable electric saw capable of developing 1 hp. and cutting any wood up to 3¾ in. in one pass. Then, as now, the saw was fitted with an adjustable and tilting base for bevel or mitre cuts, and it had an approved safety guard for full operator protection.

grade here are 4-wheel drive Jeeps and trucks or track-type tractors. It is here the project's transmission lines, with towers rising up to 150 ft. in height, go over the almost impassable glacial mountain peaks. At many locations, men have to be flown in by helicopter, and helicopters must also deliver concrete materials for tower footings and the necessary steel... There are some 5,400 workers on the Kemano portion of the project alone."

A long look at construction

Construction men and equipment are soon going to make a technicolor splash before the public eye with release by International Harvester Co. of a 55-min. documentary film called "Man With a Thousand Hands." This flick has gained critical recognition among industrial documentary films for its job of showing the work by Morrison-Knudsen on the British Columbia power development by the Aluminum Co. of Canada.

Frankly, we're impressed more than anything else by its length. Even with commercial sponsorship, the film is bound to rub off something other than I-H red on the audiences that see it. In 55 minutes, the public should pick up a pretty fair—and overdue—appreciation of the talents of construction men generally and of one of the West's most noted contractors in particular.

Incidentally, over 50 TD-24's were used on the job!

Who'll take the high road?

We're pretty certain that other roads exist which would maintain the honor of the West, but just the same we're a little anxious over the fate of the Mt. Evans highway in Colorado. This road is the highest in the United States, climbing to the mountain summit at el. 14,260 ft.

Right now it seems to be the subject of an administrative wrangle among the state highway people, the city of Denver, and Clear Creek County. The state and city boys got in first licks, respectively turning maintenance responsibility over to the city and county, and finally just the county. And Clear Creek County just can't handle the job alone, according to one commissioner.

The item we saw goes on to state that 600 cars a day have been making the trip up Mt. Evans this summer. Perhaps some enterprising fellow will horn in now with a toll proposition. It seems to be a popular idea these days. And we would imagine there is no "competing facility" to divert traffic!

By THE EDITORS