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CONSTRUCTION

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Filter material vibrated
to stabilize highway fills

Earthwork passes 25% of
new Golden Gate approach

Contractor engineering
makes Alcan work click

Boespflug's big top beats
another Alaskan winter

FEBRUARY 1954

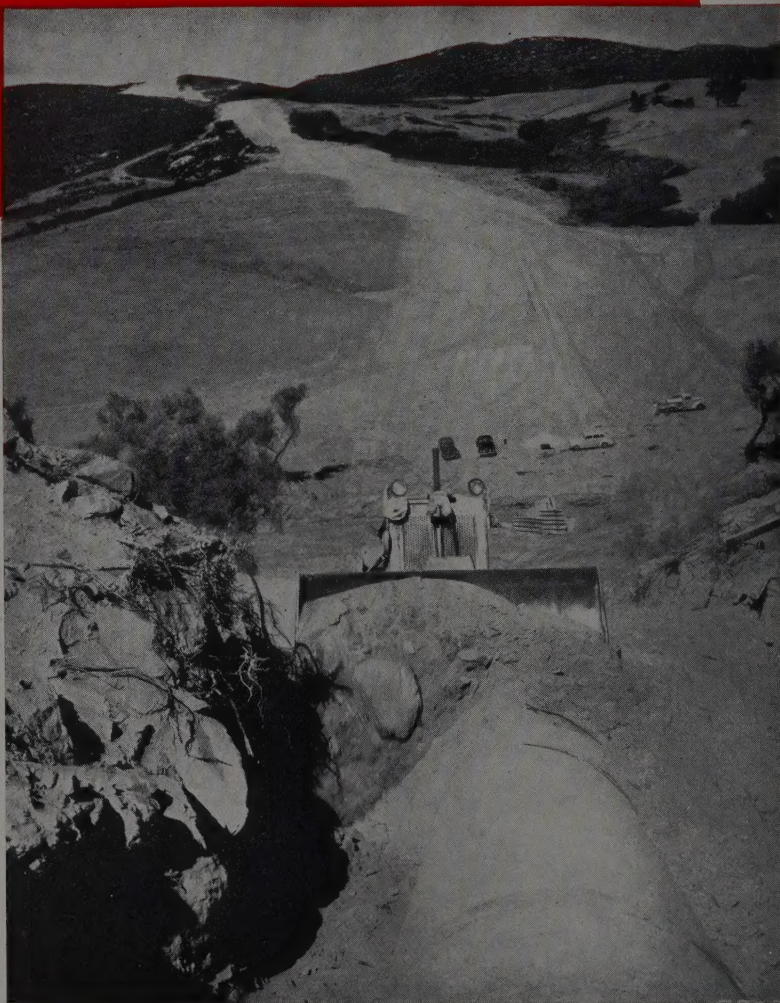
COVER see page 4

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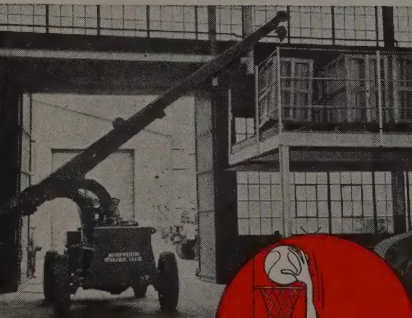
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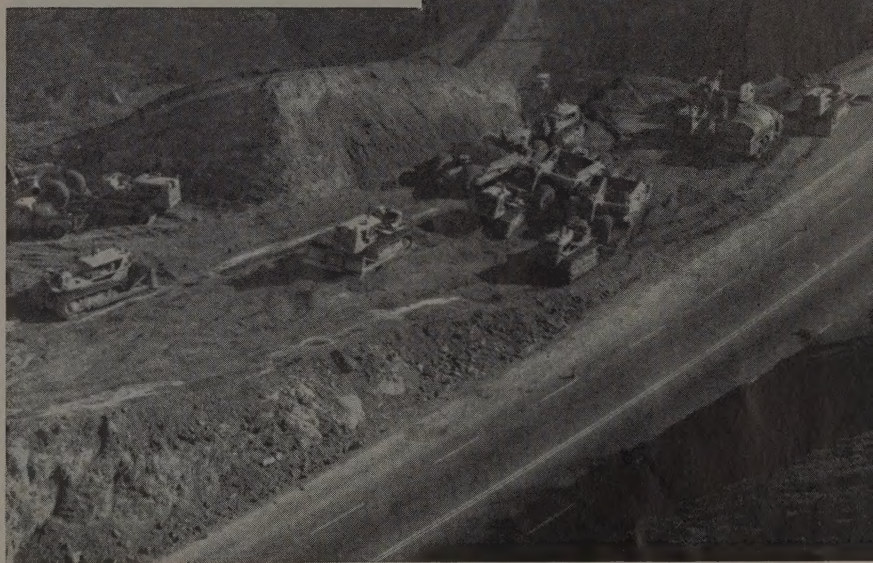
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FEBRUARY 1954

Earthmoving—4 miles

Guy F. Atkinson makes a big jump ahead on a big contract: 25% of the contract yardage is moved in 3 months — New freeway approach to Golden Gate Bridge combines tunnel, grade separations, viaducts, and 1,810,000 yards of dirt in a 270-day job



“H E CAN really move dirt!” This was the year-end commentary of Al Bouscal, who represents California’s Division of Highways for earthwork inspection on the big Guy F. Atkinson Co. freeway job north of San Francisco’s Golden Gate Bridge. With an assist from perfect construction weather clear through December, the contractor had a total of only three days interruption between the September starting date and the end of the year. During this time, about 25% of 1,810,000 cu. yd. of excavation on the project was completed.

Other features of the contract are not so far advanced, but this is no shame. The work is strung out on 4 mi. of alignment and calls for a carefully dovetailed succession of operations in order to cause the least possible obstruction of traffic. And traffic is a big factor on this job. Tourists and commuters alike cheered commencement of the work, which will provide a 6-lane freeway by construction of new fills, extension of old cuts and separation structures, driving of a 1,000-ft. tunnel paralleling an

existing one near the approach grade summit, construction of two 300-ft. sidehill viaducts and two grade separations. A landmark job for the Division of Highways also, the project for a brief time was the biggest and most detailed ever let by the state—\$4,122,382, and 142 bid items. A \$4,387,774 award in November to Peter Kiewit Sons’ Co. for Eastshore Freeway construction (also adjacent to San Francisco Bay) has since topped it.

Structure alterations

A roundup of progress on the Waldo work to date makes it easy to break out four distinct areas of activity. First, at the south end of the job nearest the Golden Gate Bridge, is structural work. The present interchange accommodating Sausalito traffic is in the form of a concrete box structure 84 ft. long, carrying 2 lanes of traffic under the 4 lanes of U. S. 101. An extension of this structure is just getting started which will increase its length to 133 ft. and provide passage overhead for a total of 6 traffic lanes.

A short distance upgrade to the north the existing highway is benched into the hillside 112 ft. above the east portal of the Fort Cronkhite tunnel, a military base access route. An extension of the tunnel barrel to a new portal 108 ft. to the east will clear the way for importation of embankment material needed to provide additional highway and shoulder width. An alternative would be more excavation into the steep hillside to achieve the same extra width, but this would pose extremely difficult problems of traffic handling as well as tremendous volumes of excavation for each increment of width.

Embankment sources

Fills required in connection with the extended undercrossing and tunnel structures, and at points between, will be derived from three sources. The first is a borrow pit near the south end of the job (and the only one on the project), which will be tapped for about 129,000 cu. yd. Another is a widened cut slightly further north. Remaining material



will be taken from excavation of the new Waldo tunnel and portal cut, the second major portion of the job, driving of which commenced on December 29 when the first timber support was placed and 3-shift operation begun.

Tunneling

Paralleling the existing tunnel with a distance of 110 ft. between centerlines, the new is a twin to the old. When completed its reinforced concrete walls will rise $5\frac{1}{4}$ ft. above profile grade to spring line, and above that point will be shaped to a $23\frac{1}{2}$ -ft. radius. The driving procedure adopted by Atkinson calls for two side drifts, timbered as necessary and having inside clear dimensions of about 12 and 16 ft., width and height respectively. When the drifts are completed, arch footing concrete will be poured in them and steel plumb posts

HAUL ROADS like this are fine while the weather holds, but progress on this fill will depend on "Cats and cans" when the weather turns. These "jeeps" will have to go to the long, flat hauls.

placed. Thereafter, the manner of excavating the tunnel core and placing arch support and remaining concrete will depend on rock conditions. Permanent steel arch rings are of 8-in., 32.6-lb. H sections, the design calling for 38 sets at 2-ft. centers at the south end of the tunnel, succeeded by 228 sets at $3\frac{1}{2}$ -ft., and finally by 58 sets at 2 ft. on the north end. Permanent concrete encasement will provide wall and arch thicknesses of 4, 3, and 4 ft. in each of these sections of the tunnel.

Tunnel equipment

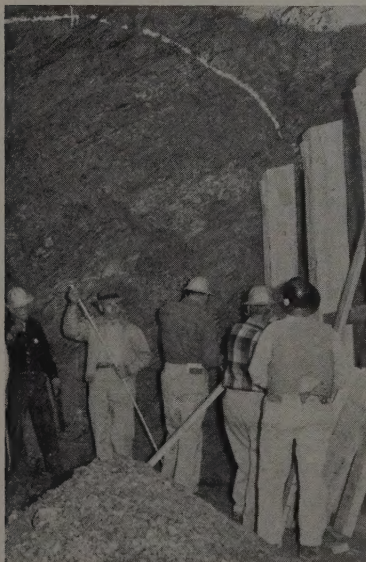
All driving operations are being conducted from the south portal, and no progress race can be expected in

driving the side drifts. One drill jumbo and one mucker are on the job, and they will be alternated between the drifts. The drill jumbo was designed and built at the contractor's yard in South San Francisco. It is a welded pipe frame mounting five Gardner-Denver hydraulic jibs on a Peterbilt truck. Plans are to use 8-ft. steel and pull 6- to 8-ft. rounds. Tunnel muck will be handled by one of the new Eimco 105's, and moved out to the adjacent tunnel approach fill by a pair of Koehring dumptrucks. High-pressure air for the work will be supplied from three Gardner-Denver 500-cfm. stationary compressors housed in a shack hard against the hillside between old and new tunnel alignments.

Immediately to the north of the tunnel the new traffic lanes will be carried on two successive side hill viaducts with a short cut section in between. The steep hillside and the presence of a residential district below made embankment construction at this point infeasible.

Two new grade separations

Full interchange between the freeway and existing residential streets in this area will be provided by two partial cloverleaf structures at Spencer and Monte Mar avenues at about the middle of the project. Splitting the interchange into two parts minimizes the width requirement for the right-of-way at a point where the topography is the steepest of any on the job. The northerly of the two interchanges, at Monte Mar Avenue, will ultimately accommodate south-bound traffic on U. S. 101 wishing to turn left, or east, into Sausalito residential areas. During construction of the freeway, however, it will be put to good use by the contractor as his only means for moving dirt out of



FIRST TIMBER (left) at the portal of a side drift is checked by Mike Roych (with folding rule) as tunneling gets under way. Atkinson's jumbo (right) was built to measure for this job, mounts 5 hydraulic jibs.



the biggest project cut and across the highway for use in, similarly, the biggest project fill. (With the exception of this cut, all widening work is being done on the east side of the highway. Only other west side excavation will be for benching and laying back existing cut slopes, stabilization work of a maintenance nature incorporated into this freeway contract for convenience.)

Traffic handling

Early work at the big cut, the third major portion of the job, has been to cut and fill as necessary on the east side of the highway to provide a detour for 4 lanes of traffic. Construction of the Spencer and Monte Mar structures above the present lanes can then be carried forward without interruption either from or to traffic. Restoration of traffic to its present route thereafter will permit orderly completion of the easterly portions of the two separation structures.

When they are complete, excavation of 790,000 cu. yd. from the single cut just north of Monte Mar Avenue can commence. The cut will be benched down by crawler-scraper combinations and by rubber-tired scraper rigs if the ground is suitable. Material will be moved southward, across the highway at Monte Mar, and then northward on the new freeway alignment, raising the new embankment there with every successive load.

Little blasting

The final major (if arbitrary) division of the job is the northerly 2 mi. of alignment, where cuts and fills very nearly balance. (Not quite, however, as material from the big Monte Mar cut will be distributed among a total of four sections of embankment.)

Most of the widening at the north end of the project is being carried out by tractor-scraper combinations, assisted in loading by pushers. However, in several places where the tops are being knocked off the outside of existing cuts, drilling and shooting is necessary. Very little traffic interruption is anticipated from this work, as the presence of power transmission lines nearby also require that the shooting be fairly light, serving only to shake up the material for easier excavation.

Progress

Structural work on the north end includes widening of another undercrossing similar to that at the opposite end of the job. The north end of the project is a few hundred yards beyond this structure, the Marin City interchange, and additional work in this last section will include a relatively small amount of earthmoving to provide extra width on the west side of the freeway.

After the award in September 1953,

Equipment on the job

EARTHMOVING

- 10 Caterpillar D8 tractors
- 6 Caterpillar 80 scrapers
- 7 Caterpillar D8 pushers
- 3 International TD-24 tractors
- 6 Caterpillar DW20 tractor-scrapers
- 7 Dual-drum sheepsfoot rollers
- 1 50-ton Wisco pneumatic compactor
- 1 15-ton ripper (Peterson Tractor & Equip. Co.)
- 1 LeTourneau K-30 ripper
- 1 Ateco hydraulic ripper
- 1 Caterpillar DW10 tractor with dozer
- 2 Caterpillar 12 graders
- 1 Bucyrus-Erie 38-B shovel
- 1 Warner & Swasey Gradall
- 9 Ford F-8 dump trucks
- 4 Wagon drills (Ingersoll-Rand and Gardner-Denver)
- 2 500-cfm. Gardner-Denver compressors
- Jackhammers (various makes)
- 2 105-cfm. Joy compressors
- 1 105-cfm. Le Roi compressor
- 2 Onan light plants

TUNNELING

- 1 Peterbilt truck (jumbo carriage)
- 6 Gardner-Denver jibs
- 6 Ingersoll-Rand drifters
- 1 Eimco 105 tractor shovel
- 2 Koehring Dumpsters
- 3 500-cfm. Gardner-Denver compressors
- 1 16,000-cfm. American fan
- 1 16,000-cfm. Suderbilt fan

MAINTENANCE (and transportation)

- 4 Ford 1½-ton flat-bed trucks
- 2 Ford sedans
- 10 Ford pick-ups
- 2 Ford grease trucks
- 1 Ford fuel truck
- 1 Ford water truck
- 1 Reo welding truck
- 1 Hobart welding machine

work was commenced almost immediately, with major earthmoving operations well under way by the first of October. Total time allowed for the contract is 270 working days, except for the portion south of the Waldo tunnel. For this work 200 days has been set, in order that a successive contract can be let for surfacing the new freeway alignment.

Good weather helps

The boost in progress which Atkinson's crews and good weather have given the job is not likely to be lost. Winter rains will slow the work by as much as 25%, but this has been expected all along. The problem is one of grades on the haul roads to and from the deep fills. Workable dirt will continue to be exposed as excavation proceeds, but wet roads are bound to limit the rubber-tired rigs and put a greater burden on the crawlers.

Three major subcontracts have been let by Atkinson on the Waldo

Freeway work. San Jose Steel Co. is providing all reinforcing steel. Raymond Concrete Pile Co. will drive piles required for all structures (except the Marin City and Sausalito interchanges at the extreme ends of the project, which are founded on solid rock). Chas. L. Harney, Inc., will do asphalt surfacing required, principally on project detours.

Highways personnel

The Waldo Freeway project is being carried out under the jurisdiction of B. W. Booker, assistant state highway engineer in District IV. William Travis is district construction engineer, and Edward J. Carter is resident engineer on the project, with Vincent Yoder as his assistant. Paul H. Talbot, associate highway engineer, did much of the project design. Charles J. Glysson, Jr., is in charge of retaining wall and drainage structure construction, assisted by Hilary Belloc. Alfred J. Bouscal is inspecting earth work, as is Everett E. Stewart. Philip Director is in charge of materials testing, with Lloyd B. Fisk in charge of surveys. Two survey parties are headed by Richard Alexander and Madison Ellis. Anne Jackson is office engineer.

Bridge personnel

The Bridge Department of the Division of Highways is well represented on the job, being concerned not only with separation and viaduct structures but also with the tunnel. (In California, any highway structure with a span of more than 20 ft. is, for all practical purposes, a bridge. Even a tunnel!) Harry H. Tarzian is Bridge Department representative. Assisting him on the bridges are Fleming Peek, Jr., Donald T. Morton, Donald Hahn, Dana A. Barnes, and Dale Foxworthy. Engineering on the tunnel finds Mike Koziol and Herbert A. Springer working with the day shift, Clifton Blevins on swing, and Everett S. Dowling on graveyard.

For the contractor George McCoy, Jr. is project superintendent, and A. G. Chaussee is assistant superintendent. Bob Atkinson is project manager. Jim Dailey is grading superintendent, Joe Lawrence is structure superintendent, and Joe Burnside is master mechanic. Job engineer is Edwin Schlue.

Atkinson personnel

Tunnel superintendent for Atkinson is Mike Roych. This is the only phase of the work which is on a 3-shift basis (except for a swing shift on equipment maintenance). Tunnel walkers include John Stone, day; Marion Semler, swing; and William C. Janshen, graveyard. Shifters as the tunneling gets under way include Thomas Joyce, Earl Crawley, Johnnie Pillows, Jesse Wilson, Robert C. McLelland, and J. D. Welty.



TIPS on designing for TREATED TIMBER

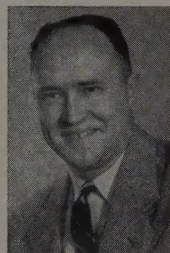
ARE YOU PLANNING to use timber in a structural application? If so, this article should interest you. Here are tips on treated timber—tips on design, detailing, specification, and fabrication. Successful performance of a treated timber structure requires attention to more than pure design matters. A good design, fortified by thorough yet realistic detailing and specification for treatment, insures long life to the finished project. Pressure treatment is intended to protect against destructive agents such as termites and decay, but its success depends on proper planning.

Cut to order

Another thing to remember is that part of the material may still be growing in the woods when the order is placed. Poles, piling, railroad ties, fence posts, and a few standard-size lumber items are normally stocked ready to pressure-treat to the buyer's specifications, but stress-grade lumber for engineered construction is usually cut to each individual order.

Normal mill deliveries on most standard sizes can normally be expected within 30 days, but delivery on special items, which cannot be cut from the logs on hand, take much longer. In addition, time for transit to the treating plant and time for fabrication and treating must be allowed for. Thus specifications calling for immediate shipments of fabricated, stress-grade, pressure-treated lumber are based on wishful thinking

By
C. F. CRAIG
Civil Engineer
Baxco Corporation
Portland, Oregon



rather than reality. Because of these reasons, purchasers should plan their requirements as far in advance as possible.

After it has been decided to use pressure-treated timber for the project, design specifications must be written. No difference in design is necessary when working with pressure-treated wood from the design procedures used in untreated wood structures, and the same allowable design stresses are applicable.

Reference specifications recommended for use by members of the wood pressure-treating industry may be found in the Manual of the American Wood Preservers Association or in Federal Specification TT-W-571(c). The AWP Manual represents the recommendations of the industry and is revised yearly. Only preservatives and methods of treating which have been proven successful through actual use are included in the manual. For individual projects, the specifications writer can usually

make reference to the AWP standard specifications for preservative and method of treatment to find a specification which suits his purpose. For comprehensive job specifications, he should identify the preservative or type of preservative desired as well as show the required retention.

Specifications should also include a statement that all practical fabrication, including end trimming, dapping, chamfering, grooving, beveling, and boring of holes is to be accomplished before the pressure treating takes place. This procedure represents a considerable saving in construction costs, because production line fabrication accomplished at the treating plant is more accurate and less costly than on-the-job framing, where the proper tools are seldom available. This procedure also eliminates the need for cutting and boring into the protective treated zone, which endangers the life expectancy of the material.

Piece detailing necessary

This specification of fabrication details makes it necessary that design drawings show the details clearly. The individual members of a structure must be piece detailed to insure accurate fabrication before framing. When these details are prepared by the treating-plant engineers, it is necessary that they be based on the designers' project drawings only. Some designers, however, include piece details with their design drawings. This practice is generally followed by the U. S. Forest Service engineers, who use large quantities of pressure-treated materials for their bridges, look-out towers, and other engineered structures.

Incising is another important item which the specification writer should include for all pressure-treated material. This insures uniform penetration

regardless of the type of preservative used. Incising, which is a standard procedure in most commercial treating plants, is accomplished by passing the lumber lengthwise through oyster-tooth rollers which separate the outer fibers of the wood. In addition to insuring uniform penetration, incising helps minimize seasoning checks. The practice of incising sawn materials has been known for many years, but a new development, now available on the West Coast, is the full-length machine incising of round poles and piling.

Economy is most important

The most economical structural designs for pressure-treated structures are those based on using 1450f, stress-grade lumber with a small percentage of 1200f included where possible. The inclusion of a small amount of the lower grade can usually be worked into the design satisfactorily. Use of this lower grade material generally makes the lumber easier to obtain at more attractive prices and presents a more acceptable cutting schedule to the mill operator.

All materials should be standard sawn or surfaced in accordance with American lumber standards. The increased cost of special surfacings or sizes is seldom, if ever, warranted from an economy viewpoint. Because economy is often the most important single design criterion, designers should try to take advantage of the material most readily available at the most attractive prices. This information is almost always available from industry representatives.

Design engineers had often been handicapped in design of long-span structures by the shortage of available sizes and lengths of sawn timbers in the past. This kept them from utilizing the many inherent advantages of pressure-treated wood. This difficulty has been overcome by the use of glued, laminated structural members.

How Forest Service does it

U. S. Forest Service engineers in Portland, Oregon, working under the supervision of Kelly Heffner, supervising bridge engineer, have designed and constructed several bridges with clear spans ranging from 30 to 61 ft. in length by use of pressure-treated, glued, laminated stringers. All of these structures were designed for H-20 loading and pressure-treated with a mixture of 50% creosote and 50% petroleum oil.

This type of pressure-preservative treatment makes these structures permanent under practically all conditions of exposure and it also cuts down on costly maintenance by eliminating the need for painting. Pressure treating of glued, laminated material can be accomplished either before or after gluing, but to insure proper penetration of preservatives

Plants and preservatives

TIMBER has long been an important member of the family of engineering materials used in the West, its application being typified not only by entire structures but by many specialized uses as well—such as poles, piling, ties, and crossarms. Today the use of timber has been made more attractive by emergence of the pressure-treatment industry. At least 60 commercial plants, totaling more than 260,000 cu. ft. of retort capacity, now dot the far Western states.

Preservatives available for commercial treating of these West Coast plants include creosote, mixtures of creosote and petroleum and creosote and pentachlorophenol, Chemonite, pentachlorophenol, Wolman salts, zinc-chloride, Protexol, and Minalith. The latter two are fire retardant as well as preservative. The type of preservative to specify should be dictated by the intended use of the material. Creosote is the only preservative recommended for use in salt water, but there are numerous other preservatives suitable for other conditions of exposure.

The largest cylinder available for commercial treating on the Pacific Coast is 8 ft. in diameter and 146 ft. long, whereas the longest cylinder is 6 ft. in diameter and 152 ft. long. Both of these retorts are located in Eugene, Oregon.

in the ring grooves, bolt holes, and sawn surfaces, treatment after gluing and fabrication is recommended. Oil-borne preservatives are recommended for use when large-size glued members are treated after gluing. When the treating is done before the gluing, either oil or salts preservatives may be used. The shape and size of the members to be treated after gluing is dependent upon the size of the treating cylinders available.

A composite deck, which was developed by the technical staff of the West Coast Lumbermen's Association, is finding increasing popularity among engineers dealing with bridge and dock construction. This deck utilizes pressure-treated Douglas Fir to accommodate the tension stresses. Compressive stresses are contained by reinforced concrete, which also provides a wearing surface. Bond and horizontal shear between the concrete and wood is obtained by dappling and grooving the wood members to develop the necessary strength. This type of construction is recommended as being economical

for warehouse or dock floors and bridges.

Another use for pressure-treated material is guard rail posts, which have become standardized in a uniform design among the highway engineers of most Western states. This post design specifies manufacture from No. 1 grade Douglas Fir, surfaced on four sides, with dimensions of 8 in. x 8 in. x 5 ft., 4 in. It has a one-way roof, and a single hole is bored in the vertical grain face for attaching the guard rail. All posts are incised and framed before treatment, which is usually done with creosote, creosote-petroleum, or pentachlorophenol. This type of post has the triple advantage of permanence, low initial cost, and low maintenance cost because there is no need to paint the post over the oil base.

Pole frame construction

Still another use for pressure-treated material is in the construction of warehouses and farm buildings which use pole frame construction, known technically as rigid pillar construction. This type of structure is supported by pressure-treated poles firmly tamped in holes 3 to 5 ft. deep. These rigidly-fixed poles carry the horizontal design loads so that only a minimum of sway bracing is required and the usual costly foundation is eliminated. Construction can be accomplished with unskilled labor and very little in the way of tools and equipment is required.

Many purchasers of pressure-treated material require a certificate from a recognized lumber inspection agency certifying as to the grade of the untreated lumber before it is fabricated and processed for treatment. This gives the designer assurance that the material is the stress grade used in the design computations. Another affidavit, from a commercial pressure-treating plant, is assurance that the treating was accomplished in accordance with the specifications. Commercial inspection is sometimes specified but is often an unnecessary additional cost. Delays and additional handling costs may be incurred unless the inspection is performed by competent inspectors.

Workers should be educated

After the material has been designed, fabricated, treated, and delivered to the job site, the contractor or user should properly educate his workers as to correct care and handling procedures. Workers who do not realize that the wood has been pressure-treated can shorten the life span of the structure by unnecessary cutting, boring, or otherwise puncturing the protective treatment zone. Use of sharp pointed tools should not be permitted. If untreated wood is exposed by accident, it should be thoroughly saturated with several applications of hot preservative.

Field engineering by the contractors

ON MOST construction jobs the engineer or the surveying, engineering and inspection staffs are recognized as direct representatives of the owner since they are employed directly by the owner. Unfortunately, they are too often presumed to be in a world apart, to have entirely different objectives from those of the contractor and to constitute just another hazard which is sometimes reflected in the bid price for the construction of the job.

For the usual job the owner knows, before construction bids are called for, just about what he wants, where, when, and the amount he can afford to pay for it. His own technical staff, or one specifically hired for the purpose, has detailed and summarized the work. A construction contract is let. Then, unless the engineering-architectural-inspection representatives and the contractor's representatives on the job are experienced and reputable, a tug-of-war starts which proves costly to both sides.

The development of combined services

However, there are many large projects now operating under lately established arrangements, the details of which are not so well known to the average owner or contractor. As the contractor's work expanded and his staff increased it became necessary for him to maintain a sizable engineering department. Sometimes he undertook to do both the engineering and construction work for the owner. Meanwhile, expanding engineering firms had combined to offer complete services for complicated projects.

Thus, there have become available technical and construction combinations to meet the demands where private enterprise requires speedy and satisfactory completion of expansion programs. In these cases final design and ultimate scope of the work may not be known when construction is begun. A target estimate may be made and a cost-plus-fixed-fee contract entered into. Contracts may be made separately with an architect-engineer combination and a contractor or combination of contractors.

Assignment of Alcan responsibilities

Such a situation is found on the project for power development in Western British Columbia for the Aluminum Co. of Canada, Ltd. For this phase of the Alcan Project separate contracts were made with two



By H. E. ECHOLS
Administrative Manager
Morrison-Knudsen Co. of Canada, Ltd.
Kemano, B. C.

organizations. The design, the primary survey and engineering controls and the inspection of construction are the responsibilities of the British Columbia International Engineering Co., Ltd. (BCIE), of Vancouver, B. C., a subsidiary of the International Engineering Co. of San Francisco. The extension and checking of control points, the supplying of lines and grades directly to the construction crews and the engineering for construction plant and facilities, costs and schedules, are the responsibilities of Morrison-Knudsen Co. of Canada, Ltd. (M-K), general contractor.

This division of engineering duties coupled with accessibility and promptness of decision of the private owner's representatives has permitted smoothness of operation and other highly satisfactory results. Other remarkable features affecting field engineering on this project are adverse climatic conditions, rough isolated country, scope and variety of work (extending 175 mi. from Kenney Dam on the Nechako River through tunnels and powerhouse and over mountains to the end of the transmission line at Kitimat), and the necessity for welding the available personnel of many nationalities and work habits into efficient, cooperating organizations.

On the Alcan Project, it was necessary to provide surveying and engineering field personnel for the following subdivisions of the work.

1. Preliminary reconnaissance and reports
2. Establishment of surface and underground controls
3. Docks and harbor works
4. Access roads and bridges
5. Facilities for plane-seaplane and helicopter operations
6. Camps, including water supply and other facilities
7. Construction plants and facilities, including aerial tramway
8. Development of quarries and borrow areas and the production of various aggregates
9. Kenney Dam, 324 ft. high, rock and earth fill, with diversion
10. Saddle dams and minor storage dams and spillways at the reservoir area
11. Intake structure for power tunnels
12. 10 mi. of power tunnel worked from four headings
13. Approximately 4 mi. of various tunnels and underground penstocks
14. Underground powerhouse excavations, structures and installations
15. Tailrace channel, bridge and weir
16. Switchyard and switching stations
17. 50 mi. of transmission line
18. Engineering inspection of operating equipment, particularly tramway and underground hoisting equipment.

Personnel and office set-ups

The BCIE maintains its design and main administrative office in Vancouver, B. C. Its field personnel and concrete control laboratory are headquartered at the main construction camp at Kemano, B. C., 500 mi. north of Vancouver. Its field organization is set up under a Chief Construction Engineer and the work subdivided under a Chief Clerk Administrative, a drafting section, a Progress Engineer, Transmission Line Engineer, Powerhouse and Tunnels Engineer, Electrical Engineer, Mechanical Engineer, Concrete Control Engineer, and engineers for special assignments.

M-K also maintains an administrative office at Vancouver where the staff includes nine of the engineering department personnel. Its field engineering personnel are headquartered at the main construction camp at Kemano under the direction of an area engineer. The work is subdivided under a Construction Engineer, a Chief Tunnel Engineer, a Field Engineer for transmission line, and an Office Engineer. A further subdivision is made under engineers for intake structure and saddle dams and spillway east of the Coast Range mountains.

A total of 24 camps have been in operation and the 220 field engineer-

ing personnel of both organizations were distributed to the various locations as the work required.

Approximately 70 transit and levels of the following makes are in use: Cooke, Dietzgen, Gurley, Kern, Keuffel & Esser, Watt and Wild. Prints are made at the main camp by both the Ozalid and the Bruning black and white processes. Communication between camps is by radio. Transportation between work sites is by helicopter, pontoon-equipped planes and, in the camps and along the transmission line, by 4-wheel-drive jeep station wagons.

Preliminary surveys

The entire work area was practically an unsurveyed and undeveloped wilderness. A bench mark had been established by the government at Ootsa Lake, on the edge of the reservoir area. Under a subcontract with BCIE, McElhanney and McRae, Surveyors and Engineers of Vancouver, B. C., ran levels during 1949 to 1951 and did triangulation work in 1951.

The elevation of 2728.66 ft. for the Ootsa Lake bench work was accepted as correct and it was tied into the system of spirit leveling 525 mi. long from sea level at Prince Rupert to Endako to Ootsa to Tahtsa Lake to the Kemano River and to sea level at Kemano Bay. About 180 mi. of leveling was by means of water transfer of mean sea level from Prince Rupert. All levels were double run and where practicable were tied into the triangulation system. A Wild M3 level was used and an ordinary wooden level rod, except in the course between the powerhouse location and the main power tunnel where there is a difference of elevation of about 2,600 ft. Here, an Invar precise level rod was used. Great care was taken in the establishing and use of bench marks and turning points.

The construction planning called for the boring of the 25-ft. horseshoe main power tunnel from four different headings simultaneously, the accurate placement and matching of the underground powerhouse, and the manifolds, drainage, access, ventilation, cable and tailrace tunnels and the accurate connections with the 15-ft. diameter inclined penstock shafts from the 2,600-ft. to the 200-ft. level.

Triangulation surveys

The triangulation network upon which the engineering controls were based is worthy of note. The primary base line was measured on the ice of Tahtsa Lake between two well marked points on opposite shores. The length of this base line is 11,160.49 ft., the average of two measurements differing by less than 0.16 ft. To make the measurements, marking boards were placed on the ice every 200 ft., lined in with a transit, and then frozen into the ice leaving the top surfaces exposed. A standardized steel tape



"REMARKABLE" is the most applicable word to describe the challenges and accomplishments of contractor field engineering on the Alcan Project. Determining transmission line locations through rough isolated country (above) often required air drops of observer, recorder and instruments. The accuracy of the surveying and engineering work, and the methods, are outlined in the accompanying article. Exemplifying the end product of overall engineering control, powerhouse engineering crew (below) works deep underground checking the setting of anchor bolts for 51-in. spherical valve in valve chamber.



was used and marks at each 200 ft. were scribed in the marking boards with a sharp knife. With the tape supported on the ice, measurements were made at night when the differences

between observed temperatures and tape temperatures would be at a minimum. There was no slope or sag to the tape except at the extreme ends of the base line where the tape was sup-

ported every 25 ft. Proper tension was made by two spring balances.

From the stations at the ends of the base line a system of quadrilaterals was marked out over the mountains the ten miles from Tahtsa to Kemano. Each of the 24 stations, including stations at the tunnel adits, was marked by a brass rod cemented or leaded in rock. A 2-in. pipe 7 ft. long, painted black and white, was plumbed at each station and held in place by a weighted wooden tripod. All the stations of the main network were laid out in the best pattern possible before any angles were read.

Angles and adjustments

A Wild T2 transit was used. This is a single-centered triangulation instrument graduated to read directly to seconds. Angles of the triangles and outside angles to complete 360 degrees were each read 20 times. All stations were occupied and 80 to 200 readings were made at each station. The elevations at the stations varied from 200 to 6,000 ft. A Bell helicopter was used to carry observer, recorder and instrument together with sleeping bags and food to remote stations.

The sum of the angles at each station averaged to within 2 seconds of 360 degrees and adjustments were then made to 360 degrees. With an average adjustment per triangle of 2 seconds it was reasonable to assume a total error in direction of 5 or 6 seconds or 1½ ft. over to ten miles. Another check was made by measuring between two triangulation stations at the Kemano end. The measured distance was 0.86 ft. from the triangulated distance, indicating a possible error of 1 in 16,000 at this point. The measurement was made under adverse conditions up a steep and rough mountainside. Applying a correction for the earth's curvature

and reducing this measurement to the elevation (200 ft.) at the powerhouse it would be about 1 ft. shorter than the triangulated distance which was founded upon the primary base line at elevation 2,800 ft.

Because most of the distances (those for the main tunnels and adits) required from the triangulation system were from 2,600- to 2,800-ft. elevation, or about the elevation of the primary base line, the triangulated distances were computed at that elevation and not reduced to sea level. A base line was established to control the topographical map of the powerhouse site. The bearing of this line was determined by astronomical observation and was carried through the triangulation system.

The accuracy of the surveying and engineering work necessary to accomplish the desired results has been demonstrated. The long inclined underground penstock bores holed through accurately. The holing through of the first two headings of the main power tunnel was full face and within 6 in. of perfect line and 3 in. of perfect grade; the downstream heading being lower.

Personnel

The selection of key personnel turned out to be a simpler matter than recruiting and training the personnel required to staff the various crews. The recruitment was largely restricted to Canada and was not based upon long enough periods of continuous employment. The turnover was large. Many of those employed were recent immigrants to Canada, including displaced persons from Europe. Engineering students were also employed during their vacation periods. Special care was necessary to make instructions understood in spite of language difficulties.

The recruiting program was handled through the company personnel departments in Vancouver with the cooperation of the Canadian Employment Service. The following supervisory personnel were directly concerned with the field engineering program.

Vancouver Office

BCIE

W. G. Huber.....General Manager
G. E. Crippen.....Chief Design Engineer
R. B. Stevenson.....Liaison Engineer

M-K

L. W. Sproat.....Personnel Director
G. H. White.....Operations Engineer
Q. R. Barnes.....Office Engineer

Kemano Office

BCIE

N. L. Hinkson
Chief Construction Engineer
F. W. Runnalls.....Resident Engineer,
Transmission Line
R. F. Covell.....Resident Engineer,
Powerhouse and Tunnels
J. R. Carson.....Field Engineer
H. P. Pfeifer.....Electrical Engineer
G. D. Johnson
Chief Mechanical Engineer
J. Langbein.....Technician,
Concrete Laboratory

M-K

A. O. Strandberg.....Project Manager
Russ Madsen.....Asst. Project Manager
R. E. Reed.....Area Engineer
J. W. Libby.....Construction Engineer
A. J. Stickney.....Chief Tunnel Engineer
D. Gerkovic.....Powerhouse Engineer
R. C. B. Henderson
Powerhouse Engineer
E. H. Steelman.....Cost Engineer
G. R. Robinson.....Scheduling Engineer
Harry B. Hough.....Materials Engineer
H. E. Echols.....Office Engineer

PART 5, the concluding installment of "The Alcan Story" describing construction of Kenney Dam on the Nechako River and related work, will appear in the next issue.

Pushing a pipeline through Arizona desert



IT'S A ROUGH JOB to push the El Paso Natural Gas Co. 30-in. pipeline through Arizona (*Western Construction*—May 1953, pp. 57-59). Shown here is construction of a 164-mi. section from Kingman to Flagstaff by Western Pipeline Constructors, Inc., of Austin, Tex. A Buckeye Model 48 trencher (left) cuts a trench 44 in. wide and 60 in. deep through caliche overburden at the rate of 600 ft. per hr. Lots of blasting to clear out the tough rock was necessary. A Link-Belt Speeder backhoe clears away the broken rock (top right). The pipe is placed next to the trench, ready for welding, by two Caterpillar D7 tractors equipped with pipelayer sidebooms (lower right). Completion date has been set for March 1954.

Specs for heavy grading remedy foundation problems with—

New highway design and method

First specified vibratory compaction in California highway practice controls placement of 104,000 cu. yd. of filter material — Embankment foundations call for special design; vibration calls for special equipment

UNSTABLE terrain traversed by 4 mi. of new highway alignment in Northern California has called for extensive corrective treatment. Design features include stabilization trenches, channel stripping, and embankment foundation stripping. An innovation on this job is the required compaction of filter material by vibratory tampers.

Location of the work is a section of the Redwood Highway south of Ridgewood Summit about midway between Ukiah and Willits. The grading contract is held by McCammon-Wunderlich on a bid of \$985,453. The new 4-lane facility will be surfaced under a separate contract during the coming summer.

Varied geological formations

The new project replaces one that was originally graded nearly 40 years ago and which, except for surfacing, has been improved little during that period of time. The existing alignment is tortuous, contouring the westerly slope of broken mountainous terrain. Geologically, the formations on the project are quite varied and involved. The area is characterized by landslides and old fault lines which have resulted in numerous springs and unstable areas. Plastic grey to brown clays mixed with a large percentage of sandstone and schist particles are encountered throughout the project. Test borings indicated plastic clay layers extending to depths of 100 ft. in several fill areas. The low permeability of this material permits high hydrostatic pressures to develop, with resulting instability unless corrective measures are undertaken.

Stabilization trenches

Stabilization trenches have been constructed where unstable fill foundations are well defined, usually in swales or ravines. These trenches are 12 ft. in bottom width, with 1:1 side slopes, and are being excavated to depths of from 5 to 25 ft. Complete subsurface exploration was not made during the design stage as the soil is too rocky for hand borings and the

By E. L. BLOMQUIST

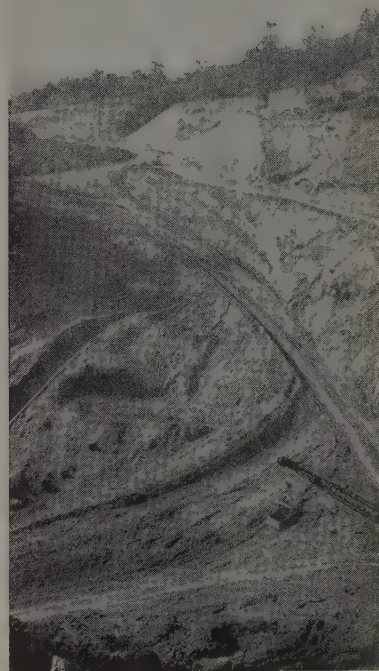
Construction Engineer
Division of Highways
District I,
Eureka, California

cost would have been prohibitive if all trench locations had been investigated by power drilling equipment. For this reason design of the trenches was based on a few power borings and on a geological study. Hand borings have been made during construction after excavating the trenches to their approximate planned grade. Final depths are determined from these hand borings. Even so, some of the trenches are "floating"; that is, they are not excavated to a firm bottom, as to do so would involve unjustified expense.

Filter installation

The trenches are generally built more or less normal to the highway but in some instances are constructed with wye branches. The bottom and side slopes of the trenches are blanketed with filter material 3 ft. thick normal to the slopes, and the remaining depth of trench backfilled with roadway embankment. Perforated metal pipe of 8- and 12-in. diameter is placed in the filter material 1 ft. above the bottom of the trench. These trenches are very effective in providing an outlet for seepage or subsurface water and for dehydrating the surrounding ground. They have proven successful for fill stabilization on earlier projects throughout District I. There are 77 stabilization trenches on this project, involving 63,000 cu. yd. of trench excavation and 58,000 tons of filter material.

A modified form of stabilization trench was designed for locations where existing water channels pass under embankments. These channels are being stripped to a width of 8 ft. and a depth sufficient to place 3 ft. of filter material. This treatment is not intended to provide foundations for culverts, as their location does not

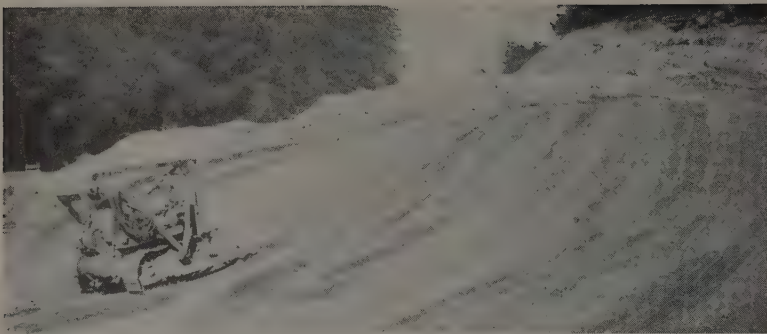


usually coincide with the existing channel, but rather to provide an outlet for seepage or subsurface water which might otherwise be trapped under the new embankment. Channel stripping in 31 locations involves 5,400 cu. yd. of stripping and 9,000 tons of filter material.

Ten large embankment areas are being stripped to a depth varying from 3 to 10 ft. to remove wet and unstable surface soils. These areas are than blanketed with 3 ft. of filter material prior to constructing embankments. This work involves 25,000 cu. yd. of excavation and 37,000 tons of filter material.

Vibratory compaction

The requirement of vibratory compaction was undertaken to minimize consolidation of filter blankets subsequent to construction of the roadway. Vibration would seem ideally suited to the granular filter material specified, and compaction by this method should prove to be both practicable and economical. However, a satisfactory field test procedure has yet to be developed to determine the relative compaction of the granular material used in these filters. And, furthermore, actual compaction results that could be expected with vibratory



EMBANKMENT foundation areas needing stripping were later blanketed by filter material. Here, the contractor's special tractor-mounted tamper works over such an area. Results seem satisfactory but evaluation by engineers is not yet complete.

tampers were not known when the project was planned. For the foregoing reasons, the customary procedure of specifying a minimum relative compaction requirement was not followed.

Instead, compaction of the filter material by vibratory tampers was specified for performance and payment as extra work. Special provisions in the contract require that filter material placed in the bottom of stabilization trenches, in channel

stripping areas, and for embankment foundations be placed in layers not more than 18 in. thick and be thoroughly compacted by the use of approved vibratory tampers as directed by the engineer. Compaction of filter material on the side slopes of stabilization trenches is not specified, as it is impracticable to compact this granular material and keep it in place on a 1:1 slope.

The vibratory equipment used by the contractor consists of three Jack-

STABILIZATION trench (top) with perforated metal pipe in place is typical of 77 installations along 4-mi. alignment. Bottom blanket of filter material, 1 ft. thick, is tamped, as will be 2 ft. of filter backfill. Filter will be carried up side slopes, uncompacted, as backfill proceeds. Tamper rig (bottom) is Caterpillar D4, with 3 Jackson electric tampers in place of bulldozer. Motor-generator unit is alongside operator's seat.



son vibrating tamper units mounted on the front of a Caterpillar D4 tractor. Each tamping unit is 24 in. wide, so that the three units mounted side by side make a total tamper width of 6 ft. The assembly is mounted and connected in the manner of a bulldozer blade, and is similarly controlled. A Jackson power plant—gasoline motor and electric generator—is mounted on the tractor, each tamper unit being operated by its own electric motor.

Further analysis needed

The tamper shoes are beveled in front and are operated only on forward motion of the tractor. Generally, from three to six passes are made over an area at a travel speed of about 24 fpm. The equipment operates satisfactorily on grades up to 25%. Compaction results being obtained have not been fully evaluated, and further analysis must be made before arriving at any conclusions. Filter material used on this work is riverbed gravel, scalped of all oversize (plus 1½ in.).

All of the foregoing corrective treatment, although it involves a large amount of work, is only preparatory to the principal contract requirement for about 785,000 cu. yd. of roadway excavation. The short time limit of 155 working days has made it mandatory for the contractor to plan a tight working schedule coordinating the stabilization work with the grading. It has been no easy task, since material excavated and stripped for the foundation treatment must be stockpiled and then rehandled in construction of embankment.

Early in January, the stabilization work was 95% complete, and grading progress otherwise was estimated at 70%. The contract should be finished by July, and will involve a total expenditure of about \$1,060,000.

Personnel

For District I of the Division of Highways, the work is being administered by Alan S. Hart, district engineer. Harold M. Hansen is resident engineer. Superintendent for McCammon-Wunderlich is James Wilson. Joe Voie is office manager.

Cold cathode handbook

A "Handbook of Cold Cathode Fluorescent Lighting" which contains 52 pages of text, charts, graphs, diagrams, and installation photographs, has been published by the Fluorescent Lighting Association. It was prepared by Bernard F. Greene, consultant to the association. It contains data on the electrical and photometric properties of the cold cathode lamp and auxiliaries. Cost of the book is \$1 per copy. It may be obtained from the association at this address: Department E, 100 West 42nd St., New York City, New York.

Driving 130-ft. steel piles

**Hard sand layer 85 ft. down makes driving tougher —
Special pile handling equipment reduces street congestion**

THE BIG NOISE in San Francisco these days, and that city's favorite noon-hour spectator sport, is provided by the biggest Raymond pile driving rig ever assembled in the West. Just about the last downtown vacant lot is now being pounded full of 130-ft. steel H-piles in preparation for erection of a 25-story office building. The Equitable Life Assurance Society of the U. S. is owner of the \$10,000,000 structure, and Dinwiddie Construction Co. has the prime contract.

Foundation design

Foundation work being done by Raymond Concrete Pile Co. is based on investigations and recommendations of Charles H. Lee, consulting engineer. The plan calls for 394 long steel piles, in clusters of 5, 7, 8, 9, or 10—mostly 5 and 9—to be driven to bedrock. Some 30 footings will be poured around these piles, and the steel building frame carried up from there. Another 21 short steel piles, only 40 ft. long, are being driven around the site perimeter for support of sidewalk areas.

Material being pierced by these piles start out as a loose sand about 40 or 50 ft. in depth. Below this point the silt and clay content increases. By city datum the job site is about el. 5, and it is at about el. -80 to -88 that driving resistance increases markedly.

Here is a layer of silty and clayey sand that is quite tough and hard, though it varies in these qualities from one location to another. As of mid-January, when about 50 piles had been driven, the hard sand required about 7 blows per in. of pile penetration. And on one occasion the figure had been as high as 33 blows per in.

Below the sand layer the material is a soft gray silt all the way to bedrock, which varies between el. -118 and -127. This formation is a Franciscan sandstone, the top 5 to 25 ft. of which is weathered. Piles are generally being bottomed in the first foot or two of this formation, specifications calling for driving with a 50,000-ft. lb. hammer until the advance slows to 15 blows per in. Such piles are rated for 135 tons bearing capacity.

In actuality, Raymond is exceeding the specification in several respects. The hammer has a 17,500-lb. ram and a 39-in. drop, giving a rating of about 57,000 ft. lb. Also, most of the driving is being continued until 30 blows per in. are required.

The long steel piles are furnished to Raymond by Columbia Geneva Steel in 65-ft. lengths, which are spliced by welding at the job site. These are 14-in., 102-lb. H-sections, whereas the few short piles required are 14-in., 89-lb. H-sections. In order to avoid congestion both in the site and on the adjacent streets when unloading piles, a conventional crane is not being used. Instead, a system of davits has been set up—similar in their operation to those used on ship-board for handling lifeboats. The four davits are of welded steel pipe construction and each is fitted with an electric hoist on a horizontal traveler. The hoists, C & M Meteors, are rated at 4,000-lb. capacity, and the davit arrangement permits a 26-ft. lift. The system was designed by Carl Cramer, district superintendent for Raymond.

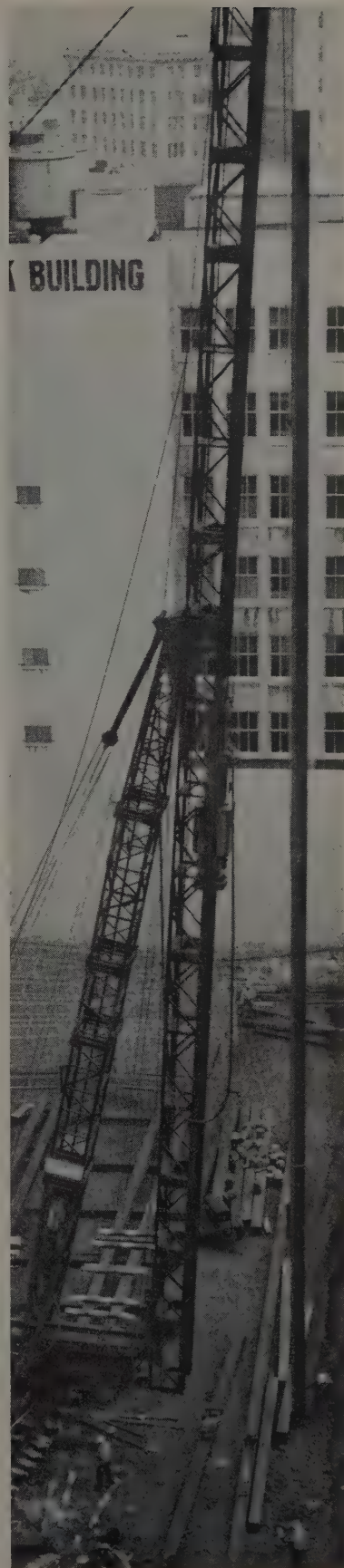
Pile driver rigging

The pile driver itself is a full revolving land rig, riding on rollers in the conventional manner. The leads are pivoted on a boom and restrained at the bottom by a "spotter" that permits about 18 ft. of horizontal motion in reaching for remote pile locations. However, use of the spotter on this job is limited since a full counterweight load is not carried at the rear end of the rig.

The hammer is a Raymond modification of a Vulcan single-acting model. The hammer line is, of course, controlled from a drum; and on this rig three other lines are also. These include the boom rigging, wire wound on the turntable, and a No. 1 line for handling piles. The only lines run to niggerheads are a gantline and a pulling line for moving the driver along a run. The length of the piles on this job requires that they be picked up initially from the ground by two lines. The No. 1 line is hooked on at the upper third point, and the gantline at the lower third point. In both cases the connection is by shackle to a steel bar welded between the flanges alongside the web of the pile. The No. 1 line does most of the lifting, and the gantline is cast off as soon as the pile arrives in vertical position alongside the leads.

For the Equitable Life Assurance Society of the U. S., architect for the new structure has been the late W. D. Peugh. The structural engineer is F. W. Kellberg. The structural steel frame will be of welded and bolted

Concluded on page 72



Concrete pours continue as —

Heated tents beat Alaskan winter



J. C. Boespflug Construction Co. uses eight portable heaters to maintain 70- to 75-deg. temperatures under the "Big Top" and meet job specifications for mixing and pour

VISITORS to the construction site of the 5-story, 400-bed hospital at Elmendorf Air Force Base, near Anchorage, Alaska, since mid-August might have had reason to believe that a circus had come north to entertain the troops when they saw a big tent perched on the partially-completed structure. This is not the case, however.

The "Big Top" is the ingenious and practical answer of the J. C. Boespflug Construction Co. on how to beat the Alaska winter and still keep concrete pouring on their rush contract for the Alaska District Corps of Engineers.

Inclement and cold weather in the Anchorage area during the fall frequently plays havoc with concrete pouring and finishing, especially on floor and roof slabs. The tent—heated—is Boespflug's insurance that weather changes will not delay placement or prevent proper finishing of slabs.

No cancellations

During the rainy season in August and September, progress on the \$8,443,400 job was not delayed by cancellation of large pours, nor did the contractor encounter heavy finishing costs brought about by being caught short with 10,000 sq. ft. of floor slab exposed to a heavy rainfall. In September alone, 2,405½ cu. yd. of concrete was placed in floor slabs in 14 days. During 8 of these days rain fell. Despite this, about 129,000 sq. ft. of slabs were placed and finished in accordance with the specifications without time loss on the schedule or slab finishes rejected.

By **ROBERT A. FARLEY**

Project Engineer
Alaska District, Corps of Engineers

Cold weather, which comes early in Alaska, can cause schedule headaches. Job specifications state:

"Unless otherwise approved by the contracting officer, concrete shall be mixed and placed only when the temperature is at least 40 deg. F., and if the temperature is less than 45 deg. F. it shall be rising. For placing at lower temperatures, when permission to pour is obtained from the contracting officer, all material will be heated and otherwise prepared. Means shall be provided for maintaining the concrete at a temperature of at least 50 deg. F. for 72 hr. after placing. Methods proposed for protecting concrete shall be approved by the contracting officer. Salt, chemicals, or other materials shall not be mixed with concrete to prevent freezing."

Many contractors are prone to shut down concrete placement at the onset of cold weather rather than attempt to comply with this specification. Not so the Boespflug organization! Bill Miller, project manager, and Tony Fellerhoff, general superintendent for Boespflug, together with the writer, worked out the system now in use to lick the cold weather placement problem effectively and to comply with specifications.

Utilizing the "Big Top" canvas previously used for rain protection, along with portable heaters, the problem was solved. The slab pour made

on October 27 was typical, so let's set the stage: Involved is a fourth-floor slab area 40 x 133 ft. The forms have been checked, along with all embedded items, by October 26.

Utilizing the long "tees" on the shores supporting the exterior beams under the slab, a two-plank walkway, complete with guard rail and toe boards, is installed around the perimeter of the slab to provide both work space for finishers and tie brackets for the canvas. From the guard rails are hung 16 x 20-ft. tarpaulins to enclose the four sides of the third floor area completely when tied in place. Into this enclosed area go four 350,000 Btu. and four 240,000 Btu. portable Silent-Glow heaters, which are placed in operation to warm up the bottom of the fourth-floor slab area.

Erecting the "Big Top"

Next in order is the erection of the "Big Top," using the same system which provided rain protection. On the fourth-floor deck, 16-ft. posts are tied to the projecting reinforcing steel of the centerline columns. Truss-type ridge poles connect the posts, and the entire support is tied to the outrigger guard rails. Over the ridge poles go 22 x 60-ft. tarpaulins, which provide roof cover for the floor area and which extend over the guard rails, lapping the other canvas to provide complete enclosure for the fourth as well as third floors. After the end sections have been placed and all tie downs are made, lights are strung and walkways are laid.

All of this is completed the day be-

NOT AN ICE SKATING RINK—This concrete floor slab dries in the 70 to 75-deg. heat provided by eight Silent-Glow portable heaters and contained under the 40 x 133-ft. tent. When the slab is sufficiently dry, the tent will be dismantled and moved to another spot.

fore the pour. Four 168,000 Btu. portable heaters, two at each end, are then placed in service and, like the ones on the third floor level, are kept burning all night under the watchful eye of a Boespflug workman.

The day of the pour is at hand. Before the arrival of the first load of concrete, temperature checks indicate that while the outside reading at 7 a. m. is 14 deg. F., at the third floor level, just below the fourth floor, we have 72 deg. F., and at the fourth floor level we have 58 deg. F.

Concrete arrives at the job site in a heated condition, in spite of a 7-mi. haul in a dumpcrete, the reading being 60 deg. F. The placing and finishing are routine despite below-freezing temperatures, which range from 5 to 23 deg. F. for the 24-hr. period, outside the tent. The finishing is completed about midnight, when the outside temperature has dropped to -2 deg. F. at the same time the slab temperature is maintained at 58 deg. F.

BABY, IT'S COLD OUTSIDE, down to plus 15 deg. in fact, but the tent keeps it hot enough for concrete workers on the inside to strip down. About 129,000 sq. ft. of concrete have been poured using this method of temperature control.

With a set-up such as described, it is a simple matter to maintain the slab at 50 deg. F. for the 72-hr. period prescribed by the specifications. While not spectacular or unique, the method does work and can be used throughout the entire cold weather season, thus enabling the contractor to carry on his work.

Foresight, planning, and cooperation among the contractor, Corps of Engineers project inspectors, and concrete supply personnel enable this multi-million dollar job to continue throughout inclement and cold Alaskan weather. The days lost during the early stages of the work, due to material and other factors, amounted to almost six weeks during the months of "prime" construction weather in an always short season.

Most of the lost time has been recovered. The building enclosure is ahead of schedule. And undoubtedly the entire project will come through ahead of its scheduled completion date of June 30, 1955.

BUGGY LOADS of fresh concrete are wheeled into the tent, made from 22 x 60-ft. tarps. Workers go from 15 to 75-deg. temperatures when they enter the tent.



Largest roof of prestressed girders and purlins in West

Kiewit casting and stressing operations build fifty 50-ft. girders and 406 36-ft. purlins for 80,000-sq. ft. beef exhibit barn on rush contract



By CHARLES J. PANKOW

Project Engineer
Peter Kiewit Sons' Co.

THE RECENTLY completed beef exhibit barn for the 48th District Agricultural Association is an 80,000-sq. ft. structure whose entire roof framing system is comprised of prestressed concrete girders and purlins. This building, the first so designed by

the State of California, was advertised for bids to be in on June 10, with the stipulation that the building be ready for the Great Western Livestock Show which was to start on November 28, 1953.

In order to manufacture the 406 purlins with a typical span of 36 ft. and the 50 girders approximating 50 ft. in length, it was necessary to use a procedure of prestressing which permitted an immediate operation of mating these members without high-tensile steel on hand, since none of the quoting companies, representing several prestressing systems, could provide high-tensile steel in sufficient quantity to keep pace with the anticipated schedule.

Purlins decided timing

It was decided to use neoprene hoses to preform holes for the high-tensile steel in the purlins, since the large number of purlins was the critical factor in the timed operation. Girder steel was available in sufficient quantity to enable the placing of metal-housed wires in the forms before pouring concrete.

Along with the problem of planning a manufacturing schedule, it was necessary to consider the type of

forming to be used. Here again time was the deciding factor, so plywood forms were decided upon as the instrument of rapid construction. A crew proceeded to build precision forms for girders and purlins as though they were constructing very delicate cabinet work. The extra expense applied to making these forms undoubtedly produced a better product with less effort.

Mixes were tested

While girder and purlin forms were being built, concrete design mixes were being tested to determine the best mix to produce 5,500-psi. concrete in 28 days. Three different mixes were tested, two with different sack contents of cement and two with admixtures (high early Pozzololith). An 8-sack mix with admixture was settled on when it met construction and design requirements. San Gabriel valley aggregate was used, although at first some questions were raised as to whether it had sufficient qualities to produce 5,500-psi. concrete.

While girder and purlin forms were being made and a concrete design mix was being prepared, a comprehensive layout plan for the contemplated casting operation was being prepared.

PRESTRESSING the concrete girders is begun by wiring friction cones to the end form. Then the cable housings, which follow catenary curve inside the girder, are pulled up tight against the cone and taped to prevent leakage into the cable housing during concrete pour. Male cone (left) is being inserted to hold cables during stressing operation,

which will be performed at the other end. On purlins, the cones are set at the time of stressing. This stressing jack (center) weighed almost 150 lb. It had to be carried by a dolly set-up for ease of handling. A typical 50-ft. girder (right) after grouting. The wires were cut off with a torch to the required permissible length.





The 232 x 338-ft. floor slab not only had sloping surfaces for drainage, it also was perforated by over 500 holes for cattle pen stanchions and precast interior columns.

Casting on the slab

Beside the 406 purlins and 50 girders, it was necessary to cast over 100 wall panels and 40 interior columns on the slab. Neither time nor space requirements permitted the casting of these approximately 600 precast elements. A fast, delicately timed casting, stressing, and erecting schedule was developed which started with the casting of the wall panels at one end of the building. By the time they were erected and the exterior columns poured in place, the first bay of interior columns had been erected, and the first bay of girders and purlins had been cast, cured, stressed, and grouted.

Meanwhile, opposite side walls were being erected and subsequent bays of girders and purlins were being prepared to allow their erection on the day following the concrete roof slab pour of the preceding bay. At one stage of the operation, wall panels at one end of the building were being cast while roof slab was being poured at the other end. There were a total of 10 bays, each containing 41 purlins and 5 girders. A period of 49 working days elapsed from the completion of the floor slab until the completion of the roof slab.

Freyssinet method used

During the entire operation, close control over the placing of hoses or sheathed cable was maintained to guard against horizontal deflections at stressing which might result from eccentric alignment of high-tensile

THIS AERIAL photograph shows the eighth bay, measuring 36 x 234 ft., almost ready for the pouring operation. Preparation of each bay for the roof-slab pour involves setting 5 girders and 41 purlins. A typical pour consists of about 12,000 sq. ft. of roof slab. There are 10 bays in the completed building.

reinforcing. The Freyssinet method, which was used, proved to be quite versatile in permitting the substitution of different length wires when several circumstances demanded immediate action. Constant cleaning and oiling of forms was maintained to preserve the forms and at the same time to produce better concrete surfaces.

Bottom forms were wasted while side forms were moved about the building to prescribed storage areas, from where purlins and girders could be erected. The girders were poured directly from transit-mix trucks and were built side by side as fast as they could be cast, set, and the forms removed. All the time it was necessary to keep driving room available on the slab for transit-mix trucks and cranes.

Dance of the three cranes

At one stage of the construction, three motor cranes were working within such close quarters that a wrong move would have resulted in a square knot made up of crane booms. One crane was setting wall panels, one was setting purlins, and the third was pouring roof-slab concrete. All three of these cranes, which have a capacity of 25 tons each, were provided by the Owl Truck and Construction Co.

During the early stages of pouring purlins and girders, and until a pattern was established, control cylinders were taken to determine the stressing date. A flexure beam test was also taken to test the modulus of rupture

of the 5,500-psi. mix. The various test data were quite valuable in determining required strength characteristics. One particular specified test involved loading a purlin with 15,000 lb. of uniformly distributed load. This was equivalent to 100% D. L. + 150% L. A total deflection of 1½ in. was measured. Thus the purlin, with a 1-in. camber as a result of stressing, actually deflected ½ in. below level under the prescribed loading. Even after the roof slab was poured, the purlins were observed to retain a slight camber.

First and largest

The construction of this project, which involved the erecting of over 4,000 tons of concrete members, was performed without injury. The cost of the work to the State of California was \$397,000. This included complete mechanical and electrical installations, various interior partitioning, and an elaborate architectural entrance which included poured concrete wing walls and canopy.

This prestressed Type I fireproof building, believed to be the first and largest of a compound system of girders and purlins on the West Coast, has proven that within a short period of time a complete concrete building, designed about the theory of prestressing, can be constructed economically.

Superintendent for Peter Kiewit Sons' Co. on the job was Lew Adams and the author was project engineer. Resident inspector for the Division of Architecture was Earl McKay.

NOTE: Just to make sure that the barn got ready for the beef, turn to page 78.

Colorado shuffles highway setup

NEW YEAR'S EVE marked the beginning of a new era in the history of Colorado's Department of Highways when thousands of miles of highways changed hands in a "big switch" involving every city and county in the state. The change was intended to provide for higher standards of construction and maintenance and the utilization of greater engineering skill.

This change, voted at the last session of the state legislature, provided for turning over about 4,500 mi. of the 12,400-mi. state highway system to the counties, which will assume responsibility for their construction and maintenance along with other county roads. At the same time, the state took over the maintenance of 3,900 mi. of federal-aid secondary roads, which had been maintained at county expense previously.

Maintenance operations increase

Under the new law, the state highway system will consist of 4,500 mi. of federal-aid primaries and 3,929 mi. of federal-aid secondaries. All state roads, including urban connections, will be constructed and maintained by the state department.

Plans for increasing the maintenance operations of the department include the purchase of \$500,000 worth of new equipment, the hiring of about 100 additional men, and the erection of 35 new maintenance stations. The sum of \$1,373,000 has been appropriated for this new maintenance for the first six months of 1954. Of this sum, \$400,000 has been allotted for immediate betterment to improve highway safety as quickly as possible. In addition, contracts have been made with 57 counties and 62 cities under which they will maintain about 2,000 mi. of highways, including certain secondary highways and urban connecting links. The cost of these maintenance contracts will range from \$200 to \$500 a mile per year, depending upon terrain and traffic volume.

Cities, counties responsible

This law provides that each county must select a primary and secondary road system. Each county will be responsible for the construction and maintenance of its highway system, and each must appoint a competent road supervisor to handle this work.

Each city and incorporated town is required by this law to establish a primary system of arterial streets and a secondary system of local service streets, but neither can include any street which is a part of the state highway system. Also, each city of 5,000 or more population must appoint a competent street supervisor.

Engineers from the state Depart-

ment of Highways are required to inspect county construction projects and city street construction work built with money from state highway or federal funds.

Another law changed the Highway Department's financial operation from a calendar to a fiscal year. Therefore, the most recent budget extended from January 1, 1953, to June 30, 1954. (*Western Construction*—January 1954, pp. 65-66.)

The total improvement program started in 1953, including major construction under contract or advertised for bids, agreements between the state and cities and counties, and oiling and traffic installations, amounts to 204 projects, covering 1,421 mi., at a total cost of \$29,131,000. This program, the biggest in history for Colorado, has produced roads of high quality, and it has been accomplished by efficient use of engineering personnel.

Federal-aid money available to the department in 1953 for work on primary, secondary, urban, and interstate highways amounted to \$8,579,000. These federal-aid funds must be "earned" before they are received by the department, which means that on a federal-aid project the department pays the contractor the entire amount for completed work and then bills the

Bureau of Public Roads for the federal-aid portion of the matched funds.

The highway budget for the fiscal year starting July 1, 1954, is now being prepared. The department will have about \$21,000,000 available for major construction work during the calendar year of 1954, it is estimated. Of this sum, about \$10,400,000 in previously budgeted projects should be available during the first half of the year, and the new budget is expected to provide about \$10,600,000 for the second half of 1954.

A look to the needs of the future reveals that this sum is not nearly enough, however, because the rural segments alone of the nearly 8,000 mi. of federal-aid primary and secondary highways requiring immediate improvement amounted to \$148,000,000, according to the rural highway sufficiency rating study published last September. Indications of the magnitude of Colorado's highway problem are revealed in the number of registrations of motor vehicles in 1953, which exceeded by 5% the number registered in 1952. At the same time, some 3,705,000 visitors entered the state, a 10% increase over the number of tourists who came in 1952.

Mark U. Watrous is chief engineer of the Colorado Department of Highways.

More comment on concrete specs

Editor, *Western Construction*:

The articles in *Western Construction* on concrete specifications have aroused my interest to such a point that I have to get into the discussion. As a civil engineer I have been working with concrete intermittently for nearly 20 yr. I have both written and used concrete specifications varying from a short paragraph in length for small irrigation structures to several-page specifications for dam spillways and conduits, airport paving and similar projects.

I would like to present another approach to specification writing that I believe is quite practical. We are interested only in the end product. If we state what we want and can determine what we have when we get it, then we should be satisfied. If we can describe the desired properties of the finished job such as strength, durability, density, absorption, finish texture and hardness or any others we may desire, why shouldn't this suffice? Why do we go into minute detail to tell the contractor what materials he shall use and how he shall proportion, mix, form, place and cure the concrete?

Is it because we are unable to determine the desired properties in the

finished product? When we write such rigid, detailed specifications we are increasing inspection costs and tying the contractor's hands. Such restrictions can only lead to contractors increasing their bid prices. I believe the contractor should be allowed maximum freedom in how he obtains the desired results. The contractor's "know how" is one of his principal assets and a large factor in determining his costs for a job. If a contractor can save several dollars per yard in placing costs by slightly increasing the slump, he can well afford the additional cement required to maintain the water cement ratio to keep the strength up.

Our present type of specifications takes considerable responsibility off the seller (contractor) and places it on the buyer. We continue to get poor concrete all too often. I'm in favor of a radical change in writing specifications which places the responsibility on the contractor, minimizes the inspection costs, eliminates the detailed "how," and emphasizes what is wanted in the end products.

M. H. WILKINS
Civil Engineer,
Soil Conservation Service,
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Jacking 96-in. concrete pipe



... beneath intersections so that it connects, on line and grade, with an open-trench storm drain calls for painstaking work and good judgment — Here's how Stolte, Inc., is doing it in Oakland

JACKING CONDUIT, culverts, or pipe beneath street intersections or railroad spurs in order to avoid obstructing traffic by tearing up the intersections is becoming more common each day.

This is the case in an industrial section of West Oakland, California, where Stolte, Inc., has a \$372,232 contract to install 3,363 ft. of storm drain sewer pipe. This includes laying 1,938 ft. of 96-in. diameter and 375 ft. of 108-in. diameter concrete pipe, plus about 1,050 ft. of miscellaneous pipe ranging in size from 8 to 66 in. About 344 ft. of the 96-in. pipe is being jacked under industrial railroad spurs or street intersections. The pipe sections to be jacked were specified "extra strength" to the supplier, American Pipe and Construction Co.

Type of soil encountered by the jacking crew is mostly red clay mixed with lenses of sand and gravel. The crew, which runs on a one-shift basis, consists of a foreman, a hoist operator, and four miners. Work is progressing at the speed of about 3 ft. a day.

Ground-water inflow, at the rate of 100 gal. per min., has been the biggest

problem encountered so far. It is being taken care of satisfactorily by a 2-in. electric pump. On the few occasions when this pump couldn't handle the flow, a 3-in. gas pump, available on stand-by call, took care of excess water.

The 344 ft. of jacking is taking place in five separate locations. At the location being worked on when the job was visited, an area 14 ft. wide and

18 ft. long was excavated to a depth of 22 ft. so that there will be 22 ft. of cover above the invert. Steel sheet piling (DP-2) 30 ft. long was driven to a depth of from 6 to 8 ft. below grade for shoring.

How it is done

At the back of the pit, a backstop was constructed of six 14 x 14-in. timbers laid horizontally, one on top of the other, up against the steel sheet piling. The first pipe section, each of which weighs about 11½ tons and is 8 ft. long, was lowered into the pit by a Northwest No. 6 crane which had been used previously with a clamshell bucket to excavate the working area. In addition, eight 10 x 10-in. 42-lb. wide flange beams were placed vertically on 4-ft. centers and held in

Other storm drain projects in Oakland

THE JOB REVIEWED in the accompanying article is only one of nine projects either under construction or planned by the City of Oakland to give complete storm drainage protection to West Oakland, when they are finished, at a cost of about \$4,000,000.

This overall project was broken down into nine separate contracts in order to enable more contractors to bid on the work and also to enable the City to spread out payments over a longer period of time.

Contract award amounts or engineer's estimates are listed for each of the other eight jobs:

Company	Amount	Job to be done
McGuire & Hester.....	\$917,808	1,275 ft. of reinf. conc. single box culvert 1,835 ft. of reinf. conc. double box culvert 560 ft. of 72-in. diam. concrete pipe
M & K Corp.....	739,000	A single-story, 70 x 90-ft. reinf. conc. pump house
Stanley H. Koller Construction Co...	249,250	3,070 ft. conc. pipe, 12 to 78-in. diam. 4,700 ft. sewer line, 8 to 36-in. diam.
Stolte, Inc.	246,531	2,800 ft. of conc. pipe, 60-in. diam., 900 ft. of it placed on conc. cradles
Not awarded yet	410,000	4,800 ft. of conduit, 12 to 96-in. diam.
Not awarded yet.	100,000	Outfall channel in San Francisco Bay
Not awarded yet.....	900,000	13,000 ft. of conduit, 12 to 72-in. diam. 13,000 ft. of sewer line, 8 to 33-in. diam.
Not awarded yet.	120,000	3,500 ft. of conc. pipe, 12 to 36-in. diam.

PICTURED ABOVE:

Pushing up against the 9-ft. square jacking frame is 100-ton Rogers hydraulic jack. The end of the 96-in. concrete pipe is visible (left). Vertical wide flange beams are supplemental backstops used in leapfrogging jacks ahead.

place by blocking and bracing. Their purpose is to make possible leapfrogging ahead of the jacks so that the whole setup doesn't have to be dismantled each time the limit of a jack ram is reached.

A 9-ft. square jacking frame made of 14 x 12-in. 78-lb. wide flange steel was faced with 2 x 12-in. planking and butted up against the end of the pipe. Two 100-ton Rogers hydraulic jacks with 5-in. ram diameters were placed between the frame and the backstop ready for the jacking to start. First, however, a T-shaped steel overcutter was cut from $\frac{7}{8}$ -in. plate and mounted on the leading edge of the pipe to act as a cutting edge.

The jacks are pushed by a Rogers hydraulic pump, capable of developing up to 10,000 psi., powered by an 18-hp., 4-cylinder, gasoline engine.

Mucking out

Several 3 x 12-in. planks were placed across the bottom half of the pipe front to keep the muddy ground from sloughing too rapidly. Miners work at the face with Chicago Pneumatic clay spades and hand tools. The heading is mucked out by loading a wheelbarrow with shovels and wheeling it to the open part of the pit, where the bucket is detached from its frame and hoisted up to a dump truck by an air-operated tugger hoist capable of 1,000-lb. line pull.

The ram limit of the jacks is 30 in. As each ram protrudes from its jack, a canvas cover is placed over it in order to prevent dirt and sand from being drawn back into the body of the jack when the ram is retracted. When the ram limit is reached, timber blocking is added to push the jacks up to the next set of vertical steel.

This particular section will be jacked for its full 64-ft. length. Then the jacks will be reversed and a 72-ft. section will be jacked in the opposite direction from the same pit. The two jacked sections will be joined by other pipe sections, lowered into place and connected just as in the other open-trench parts of the job. The three remaining jacking areas are 88, 72, and 48 ft. in length.

The 88-ft. section is already com-



MINING FOREMAN Leo Durocher (left) and Superintendent George Trivitt check the shoring in the jacking pit. Steel sheet piling 30 ft. long was driven around the perimeter of the pit to keep the dirt walls from caving in.

pleted. The two 100-ton jacks were sufficient to push the pipe through for the first 64 ft., but then increasing ground resistance and friction forced the addition of two 50-ton jacks with 4-in. diameter rams. They were placed against the jacking frame well above the 100-ton jacks. The purpose of the frame is to act as a sponge which absorbs the load of the jacks and spreads it as evenly as possible against the pipe end.

Connections

As each pipe section is lowered into the pit, it is joined to the preceding one by means of the tongue-and-groove construction of the pipe ends.

MUCKING OUT at the jacking heading (left). Bracing to keep ground from sloughing too rapidly is placed across the lower half of the pipe. Waste material (right) is hoisted out of the jacking pit. The jacking frame is shown butted up against the pipe end and at the bottom of the pit are two 100-ton jacks used in the operation.

Then the connection is grouted both inside and out. After all pipe sections have been jacked into place, the inside mortar at the joints, which usually cracks under the strain of the jacking operation, is chipped out and replaced with fresh grout in order to make the joints water-tight. Where the jacked sections of pipe join the open-trench section of the storm drain line, a reinforced concrete collar is constructed to make the connection.

Line and grade of the sections being jacked are checked every day. If there is any deviation, an 8-ton hydraulic jack is placed between the leading edge of the pipe and the ground ahead, and the pipe is forced back into line or grade. A footing is prepared for the jack by digging a hole in the face opposite to the direction in which the pipe is going to be pushed. Timber planking is placed under the jack to help support it. Then the ram end of the jack is butted against the inside of the pipe so that it will be pushed in the desired direction.

At the time the job was visited, the jacking part of it was about 30% complete. The completion date is expected to be about the end of May 1954.

Equipment

Equipment on the job includes two Northwest No. 6 cranes, a Northwest No. 78 crane with a $6\frac{1}{2}$ -ton No. 50-C Vulcan pile-driving hammer, five Autocar trucks, a $1\frac{1}{2}$ -yd. Hough Payloader, and a boiler with driver. Among the other equipment is a Worthington 300 compressor to power the air tools in the heading.

Personnel representing the City of Oakland include James E. McCarty, supervising civil engineer in charge of construction; F. G. Cheney, associate engineer in charge of surveying; and Jack Clark, city inspector.

Stolte personnel include Maurice McClure, utilities manager; George Trivitt, job superintendent; Leo Durocher, mining foreman; Frank Contardi, labor foreman; Kenneth Nance, assistant labor foreman; Ernie Miller, crane operator, and H. G. Crow, oiler.



Bid call expected soon for Santa Felicia Dam

Rolled-earthfill structure to rise 200 ft. above streambed on Piru Creek in Ventura County, California — Storage capacity of reservoir to be 100,000 acre ft. from 422 sq. mi. drainage area

BIDS for the construction of Santa Felicia Dam in Ventura County, California, will probably be called late this spring. The United Water Conservation District has prepared final plans and specifications during the past months, with an eye toward setting a construction schedule that will call for completion of the structure late in 1955.

Santa Felicia dam will be constructed on Piru Creek, a principal tributary of the Santa Clara River, about 4½ mi. upstream from the town of Piru. It will be a rolled-fill structure rising 200 ft. above the present streambed, and having a storage capacity of 100,000 acre feet. A lower river conservation system will consist of diversion works, conduits, spreading grounds, terminal reservoirs, and wells.

Bond issue voted

The people of the conservation district last October voted in favor of a \$10,939,000 bond issue for the construction of a dam and a lower river conservation system. This plan represents the culmination of 25 years of effort by leaders of the area and 2½ years of intensive study and planning by the district. The project will con-

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serve an average of 32,500 acre-feet per year for beneficial use within the district. This will balance the present overdraft of 32,000 acre-feet per year and represent an important step toward the ultimate solution of the water problems of the area.

In making the final selection of the Santa Felicia site, extensive hydrologic and dam design studies were made. A total of 5 sites on Piru Creek, 6 on Sespe Creek and 1 site on Santa Paula Creek were investigated before the Santa Felicia site was finally selected as the best first step in an overall plan that will later call for additional construction.

Hydrologic studies showed that the optimum capacity for each site with respect to yield was that capacity which would essentially control all floods of usual or moderate volume. Storage above this capacity would be used only infrequently as holdover storage, and hence the yield of new water becomes relatively more expensive.

On lower Piru Creek there are several alternative sites which are comparable in desirability. Preliminary designs and cost estimates showed Santa Felicia to be the most economical. This economy results primarily from advantageous spillway and diversion opportunities and the availability of construction materials. The drainage area above the dam is 422 sq. mi. The flood peak of record (March 2, 1938) was 35,600 cfs., and the maximum possible peak is estimated to be 133,500 cfs. This necessitates an extremely large spillway structure.

Reservoir limitations

The spillway situation at Santa Felicia influenced the choice of reservoir capacity. The optimum size of reservoir from a yield standpoint would be around 60,000 acre-feet; however, due to the topographical features of the site, it is possible to build a 100,000 acre-foot capacity dam for very little more than the 60,000 acre-foot capacity dam would cost. Thus it appeared desirable to build the larger dam. An upper limit of 100,000 acre-feet is required to avoid the inundation of an upstream site (Blue Point) which may be required at some future time.

The Santa Felicia site is readily accessible by California State Highway 126 to Piru, then by a good paved county road to the dam site.

Suitable materials for embankment and for concrete aggregate are plentiful within easy hauling distance of the site. Ample working room is available for all types of earthmoving equipment, and the construction should present no more than the usual problems. The outlet tunnel, which will pass through alternating sandstone and shale layers, will require lining and some shoring.

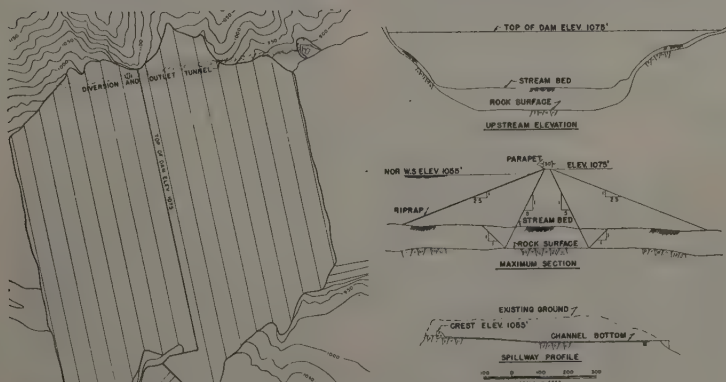
Breakdown of quantities

Major items involved in the dam construction are: 4,200,000 cu. yd. of rolled fill, 1,350,000 cu. yd. of excavation, 25,000 cu. yd. of concrete, 1,270 lin. ft. of 10-ft. diameter tunnel and 2,400,000 lb. of reinforcing steel. The total estimated cost of the dam, including land acquisition, oil rights and engineering expenses, is \$8,000,000.

The major items involved in the lower river system are: 76,000 ft. of pipeline varying from 18 in. to 75 in. in diameter, 20,000 ft. of canal and the construction of a 125-acre spreading ground. Total estimated cost of this part of the work, including land acquisition, right-of-way and engineering expenses, is \$2,939,000.

Key personnel on the project are E. C. Kimball, director and president of the board; Julian Hinds, general manager and chief engineer; C. A. Bissell, office engineer; and G. I. Wilde, construction engineer, lower river system.

PLAN AND SECTIONS OF PROPOSED DAM



PROPOSED design of Santa Felicia Dam shows the topographical plan (left) with spillway crest at elev. 1055 ft. and top of dam at elev. 1075 ft. Various sections are shown above.

Tri-Dam Project gains new life

California congressmen present bills seeking \$10,370,000 in interest-free funds from the federal government — Irrigation features of the proposed project are emphasized

THE TRI-DAM Project on California's Stanislaus River, indefinitely deferred last summer due to the rise in bond interest rates which forced rejection of bids received in April 1953, has been actively revived. Engineers and administrators of the project's sponsors, the South San Joaquin and Oakdale irrigation districts, are engaged in negotiations which, it is hoped, will clear the way for a new bid call next fall or in the spring of 1955. Their actions reached a preliminary climax early this year with introduction of enabling legislation—an appropriation request in the form of a joint resolution—presented in the House of Representatives by Representative Leroy Johnson. Certain technical changes are incorporated into a version of this bill scheduled for introduction in the Senate by Senator Thomas H. Kuchel.

Bond interest rates still high

Although bond interest rates have fallen below the peak reached last fall, they are still high enough to affect adversely the financial cushion thought to be necessary in carrying out construction of the complex of three dams and appurtenant power features on the middle fork of the Stanislaus River (*Western Construction*—November 1952, pp. 64-65). In brief, current measures seek to enhance economic feasibility of the project by having the federal government provide an interest-free reserve fund of \$10,370,000 representing the estimated construction cost of proj-

ect features properly allocable to irrigation.

The irrigation districts' directors and engineers note that, in the case of a federal reclamation project, interest on the cost of irrigation features is considered as a "non-reimbursable." They feel that, in the case of a locally sponsored project which incidentally contributes to Western reclamation, similar financial benefit may legitimately be sought. This is not a sweeping or grandiose concept, but it is one which, if accepted, will be of great and continuing significance to many Western areas that are today contemplating local reclamation or irrigation projects.

In the above light, it is interesting to review other ideas that were successively considered and rejected for one reason or another before it was determined to enter today's joint resolution before Congress. For the Oakdale and South San Joaquin directors, there have been many months of deliberations and conferences with public officials, contracting bodies and legal authorities.

Original plans for financing

In originally planning the Tri-Dam Project and its financing, a bond interest rate of 3% was the criterion, although reasonable expectation was that interest rates would not vary above 2½%. However, the rates went up to 4% and 4½% last summer and, since the districts' bond issue was backed solely by fixed power revenues already contracted with Pacific Gas &

Electric Co., it was necessary first to defer contract awards and then to reject all bids. The decision to reject was an agreed course of action between the districts and the contractors involved, but it did not come about until attempts had been made to fix "ceilings" on contract prices. It is no surprise that such ceilings could not be determined to everyone's satisfaction, but resort to such a device came up for first consideration because bond houses interested in the districts' issue said this would be needed to make the bonds saleable. There were two requirements set forth: an absolute maximum construction cost, and a fixed completion date.

Other action sought

When, in August, it became necessary to drop negotiations based on bids already received and reject those bids, the irrigation districts turned to other courses of action. The grant of an outright federal loan to cover all construction costs, with repayment to come from bonds secured by the completed project, was easily determined infeasible, there being no precedent and no appropriate lending agency available.

The position of the districts today results from pursuit of a second idea: that a federal interest-free loan should be sought for irrigation features of the project, the money to be used if and when needed. In connection with this very preliminary notion, the districts' directors met with Representative Leroy Johnson and Senator Thomas Kuchel, both from California, and discussed with them the position of the districts under each of several Congressional bills then under consideration. These bills, generally, proposed that certain federal assistance, either money or a pledge, be made available to certain

PRINCIPAL ITEMS OF WORK AND QUANTITIES

DONNELLS DAM, TUNNEL AND PLANT	Unit	Estimated Quantity
Excavation, diversion tunnel (16-ft. horseshoe).....	lin. ft.	1,200
Foundation excavation.....	cu. yd.	310,000
Spillway excavation.....	cu. yd.	55,000
Concrete in dam, thrust block and spillway.....	cu. yd.	247,000
Structural steel in radial gates and guides.....	lb.	425,000
Tunnel excavation (12 ft., 6 in. x 13 ft., 0 in.).....	lin. ft.	37,900
Concrete in tunnel invert (entire length).....	cu. yd.	7,000
Concrete in tunnel arch (where required).....	cu. yd.	19,000
Reinforcing steel in tunnel.....	lb.	270,000
Steel penstock and plate steel lining.....	lb.	3,100,000
Foundation excavation for plant.....	cu. yd.	15,000
Reinforcing steel in plant.....	lb.	500,000
Structural and miscel. steel in powerhouse and switchyard.....	lb.	170,000

BEARDSLEY DAM AND POWER PLANT

	Unit	Estimated Quantity
Excavation, diversion tunnel (17-ft., 6-in. horseshoe).....	lin. ft.	1,600
Foundation excavation.....	cu. yd.	300,000
Spillway excavation.....	cu. yd.	540,000
Embankment for main dam.....	cu. yd.	3,000,000
Concrete in tunnel and spillway.....	cu. yd.	34,000
Reinforcing steel.....	lb.	3,000,000
Radial gates and guides.....	lb.	600,000
Miscellaneous structural steel and metalwork.....	lb.	450,000
Steel penstock.....	lb.	500,000

TULLOCH DAM AND POWER PLANT

	Unit	Estimated Quantity
Foundation excavation.....	cu. yd.	150,000
Mass concrete in dam and spillway.....	cu. yd.	200,000
Reinforcing steel.....	lb.	1,000,000
Radial gates and guides, steel.....	lb.	1,000,000
Structural steel.....	lb.	360,000
Plate steel conduit liner.....	lb.	175,000

Here is Representative Johnson's bill

AUTHORIZING the appropriation of money to be available for use in assisting the construction of the Tri-Dam project on the Stanislaus River in California, and providing for the repayment of any such money so used, after the amortization of the bonds locally used for such project.

WHEREAS the Tri-Dam project on the Stanislaus River in California is designed primarily for the purpose of providing urgently needed supplemental water for irrigation, but will in addition produce hydroelectric energy, flood control, and other public benefits; and

WHEREAS temporary financial assistance by the Federal Government may be required for the completion of such project by the two irrigation districts which have jointly undertaken it; and

WHEREAS it is the established policy of the Federal Government to encourage and assist State and local agencies in developments of this kind, and this can best be done in the case of the Tri-Dam project by guaranteeing that financial assistance will be available to the two irrigation districts concerned, on a reimbursable basis, in the event that such assistance should be required at any time in order to complete the construction of the project without delay: Therefore, be it

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That there is hereby authorized to be appropriated the sum of \$10,370,000, to be set aside and kept available by the Secretary of the Interior for a period of five years for use in providing financial assistance to the Oakdale irrigation district and the South San Joaquin irrigation district (agencies of the State of California) in connection with the construction of the Tri-Dam project. The

Secretary of the Interior shall promptly pay such sum (which is equal in amount to the estimated construction cost of the features of the project properly allocable to irrigation) to such districts if he determines within the five-year period that such assistance is required by such districts in order to complete the construction of the project without delay. Any part of such sum paid to such districts shall be repaid to the United States, without interest, after all bonds issued by such districts to finance the construction of the project have been fully amortized (including refunding bonds which may be issued), in accordance with an agreement to be entered into between districts and the Secretary of the Interior when all such bonds have been amortized.

SEC. 2. There is hereby authorized to be appropriated such additional sum as the Secretary of the Army determines to be a proper contribution based on the flood-control benefits provided by the Tri-Dam project, to be paid by the Secretary of the Army to the Oakdale irrigation district and the South San Joaquin irrigation district (agencies of the State of California) jointly as an additional contribution to the cost of the construction of such project.

SEC. 3. As used in this joint resolution, the term "Tri-Dam project" means the multiple purpose irrigation hydroelectric project on the Stanislaus River in California, jointly undertaken by the Oakdale irrigation district and the South San Joaquin irrigation district (agencies of the State of California) and presently licensed by the Federal Power Commission under project Numbers 2005 and 2067.

The foregoing, H. J. Res. 330, 83rd Congress, 2nd Session, was introduced in the House of Representatives on January 6, 1954, by Leroy Johnson of California, and was referred to the Committee on Interior and Insular Affairs.

local sponsors for certain types of projects. None seemed quite applicable to the California districts' situation, however; so plans were laid for having appropriate specific legislation introduced at the 1954 session.

An obvious necessity was evaluation of those features of the project for which financial assistance was to be sought. Irrigation features were studied by the irrigation districts' engineers and a value set upon them, using criteria of the Bureau of Reclamation. At the same time, flood control aspects of the project were taken over for study by the Corps of Engineers. Determination of the flood control value of the Tri-Dam Project is a difficult one, since the project will not be operated primarily for that purpose. Nevertheless, some residual benefit is expected to be established.

The Oakdale and South San Joaquin districts gained encouragement at this stage from informal conferences with other government officials. There was revealed the possibility that precedent already existed for the type of assistance they sought. With or without precedent, however, they felt it unfortunate that there are presently no comparable projects contemplated in California, with whose sponsors Oakdale and South San Joaquin could unite in pressing for legislation.

Partly, this results from happenstance. However, it results also from the fact that available dam sites in California do not measure up in economic feasibility as they once did. Except for those that can be integrated into existing projects or handled economically by stage construction, there is only an occasional project, such as Tri-Dam, that shows a favorable benefit-cost ratio. It is interesting to note in this connection that when Oakdale and South San Joaquin were faced by rising interest rates, their first and easiest realization was that the project could not be scaled down in any way without a disproportionate loss of irrigation benefit.

Two possible solutions

Further thought on the now accepted idea of federal assistance to meet the cost of irrigation features developed two alternate courses of action. One would be to seek an outright grant of the money amount determined to represent that cost. The other would be to seek the services of the federal government only as a guarantor, if and as needed, of an amount not to exceed that properly allocable to irrigation.

The former course of action is the more attractive in one respect. With the future needs of other local dis-

tricts or bodies in mind, it provides for the most uniform treatment. On the other hand, there is particular appeal to a procedure that might result in no cost to the federal government at all. Such would be the case if the government were a guarantor. That is, if all estimates proved accurate and construction proceeded to completion without delay, bond issue funds alone would cover everything to the satisfaction of all concerned.

The result of the foregoing and many other considerations is the joint resolution that has been introduced in Congress. It is reproduced in entirety on these pages. By its provisions, financing of the Tri-Dam Project would be firm to a significant degree, thereby easing the minds of interested bond investors.

Prospects for the Tri-Dam Project, based on developments so far, appear good. And it is fair to say that, as these prospects appear good, so do the prospects for comparable projects yet to be undertaken elsewhere in the West. The Oakdale and South San Joaquin irrigation districts' confidence in the Tri-Dam Project can be measured by the more than \$1,000,000 which they have invested in its planning and furtherance to date. To this extent also they are leading the West toward the solution of a Western problem.

TAXES—and what to do about them

ALMOST EVERY DAY—as you earn your money and spend it—you have opportunities to reduce your taxes.

Everyone has a heavy tax burden as a result of our national defense requirements, but the government wants taxpayers to pay only their fair share. The Supreme Court has stated that every person has the right to take legal steps to make his taxes as low as possible. To keep your taxes low, you need good accounting, and you need to plan your business transactions with legitimate tax savings in mind.

The following cases are examples of how advance planning can minimize taxes. These cases, of course, cannot serve as a substitute for professional advice on your own particular problems, since even an apparently unimportant variation might completely alter your tax status.

Son on the payroll

George Decker's son, a high school senior, helped his father during the summer vacation and on weekends. Decker, with one eye on income taxes, made a salary arrangement whereby he paid his son the proper wage, but was careful to allow him to work only long enough to earn \$599. He withheld income tax on his son's wages, and the boy had to file a return in order to get his refund. But the son did not have to pay any tax, since his income was under \$600, so Decker was able to deduct the \$599 as a business expense—and was able to deduct \$600 for him as a dependent.

Often just the form of a business transaction will be important. Jack Thomas' experience in buying a new truck illustrates this point nicely.

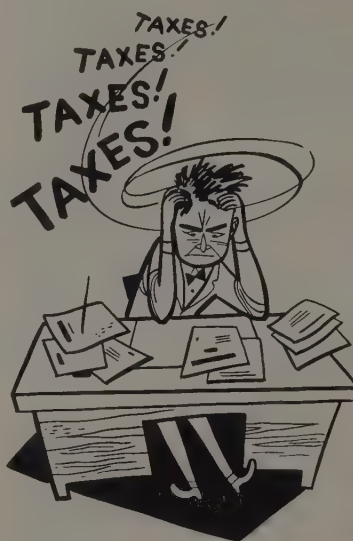
Thomas decided to replace his old truck with a new one. His old truck had a depreciated value on his books of \$1,800. But the old truck had had hard use, and the dealer would allow Thomas only \$1,000 for it on a trade-in.

Alertness pays

By chance he happened to mention the trade-in to a certified public accountant, who pointed out that by **selling** the truck for less than its depreciated value Thomas would have a book loss of \$800, which he would be able to deduct from his current taxable income. If he **traded in** the truck, he would **not** be allowed to claim the loss. For income tax purposes, no gain or loss is considered to result from a trade-in. But had Thomas been offered \$800 **more** than the depreciated value of his old truck, he would have gone ahead with a trade-in, since his profit on the trade-in would not be taxable.

There are many opportunities such as this where a transaction in one form may be taxed higher than a deal which accomplishes the same purpose in a slightly different manner. It will pay you to be alert to such opportunities. The time and form of a deal, as it affects your taxes, may sometimes be more important than dicker for a more favorable price.

Tax economy is possible, however, only through good accounting and—when legal problems are involved—through consultation with your attorney.



Depreciation

When you buy assets (equipment, buildings, etc.) which do not wear out within a year, you are allowed to deduct a portion of the cost from your income over what is considered the useful life of the asset. The allocation of cost over the estimated life is known as depreciation.

Depreciation is complicated. For instance, the first step in figuring depreciation is to determine the cost of the item. But is the cost of the item what you paid for it? Not necessarily—it may be cost, plus installation, plus freight, plus improvements, plus carrying charges.

The government publishes depreciation rates on new machinery, but not on second-hand machinery. Your accountant can help you set a rate of depreciation on second-hand equipment which will be acceptable to the Treasury and fair to you.

This article was prepared with the cooperation of the American Institute of Accountants, national professional society of certified public accountants.

To secure maximum credit for depreciation, it is absolutely essential to have complete records, for without them you risk higher taxes. The Treasury has court precedent to "bear down heavily on those whose inexactitude (failure to prove exact costs) is of their own making."

A good accounting system—installed by a CPA—will help you keep not only your taxes, but other costs, under closer supervision.

Replacing insured losses

Jim Callahan found out that "close supervision" saved him a considerable sum of money when his shop, insured for \$20,000, burned to the ground. The insurance was held up, due to a technicality, but rather than wait until it was paid Callahan decided to go ahead and buy a nearby building for \$20,000. His accountant stopped him just in time to save several thousands of dollars in taxes.

His tax would have resulted from a little-known fact. For tax purposes, Callahan had been depreciating his building every year until, at the time of the fire, its depreciated value was \$10,000.

Since he was to receive \$20,000 insurance, he would have a book gain of \$10,000—even though he had made no actual gain. If he had gone ahead, as planned, he would have had to pay the tax on that \$10,000.

Callahan would have failed to meet an important requirement necessary to avoid a taxable gain: namely, buy and pay for new property after—never before—insurance proceeds are received.

It is also usually a good idea to put the insurance money in a separate bank account, so that it can definitely be shown that the proceeds of the insurance were used to pay for the new property.

Find out the facts

These same rules apply to all casualty loss proceeds: storm, auto, wind, etc. If you have a casualty loss, remember that Callahan, devoting only a few hours to finding out the tax facts from his CPA, saved himself several thousand dollars in actual taxes.

The moral of this story would seem to be that the small contractor, too, can save himself lots of headaches and lots of money by making use of a CPA to solve his tax problems. Big construction outfits, here in the West, are usually organized so that accounting experts keep an eye on the overall operations. By consulting a CPA, a small contractor can get the benefits of the same type of experience, education, and skill in the accounting field.

Farm reservoir is waterproofed with—

Plank-type, prefabricated asphalt lining



Price of \$1.55 per sq. yd. includes linings, adhesive sealing mastic, soil sterilant, and freight — Takes 20,000 sq. ft. of lining to cover 170 x 200-ft. pond

AT A MATERIALS cost of approximately \$1.55 a sq. yd., a farm reservoir near Santa Barbara, California, was waterproofed using exposed, plank-type, prefabricated asphalt linings. The price included linings, adhesive mastic for sealing joints, soil sterilant for weed control, and freight. The reservoir, 170 ft. long by 200 ft. wide, is on the farm of Archie M. Edwards. About 20,000 sq. ft. of lining were used.

Sheets were installed directly over the ground surface which had slopes on a two-to-one grade. No extensive preparation of sub-grade was necessary, due to the flexibility of the linings, which adjust themselves to ground contour. The linings were installed without the use of special equipment or skilled labor. Another unique feature of these linings is that they do not require a covering backfill.

Installation

Sheets are 3 ft. wide, $\frac{1}{2}$ in. thick, and are cut at the factory to any convenient length up to 12 ft. When they are installed across the width of a canal, a 3-in. lap is made on the long sides and a 6-in. lap on the short sides (ends) when two more sheets are used.

Laps are made downstream to reduce friction. Both the lapped and lapping sheets receive an application of sealing mastic. Joints are then repointed to insure a watertight joint. Sheets overlap the shoulder of the canal by from 6 to 12 in., depending

on the size of the project, and are anchored to the berm of the canal by wooden or steel pegs driven through the linings. The edges of the linings are then backfilled.

Using an alternate method, sheets are butted together, sides and ends. In this case, a covering strip, 6 in. wide, is used and sealing-repointing operations are carried out in the usual manner.

If repairs are necessary, they can be made easily in a matter of minutes. A crack-filling mastic is applied to the area when dry. The composition of the mastic is such that it becomes part of the lining, rather than an alien substance held in place by pressure.

Present use

While of relatively recent development, the linings have proven their merit, in industrial and agricultural waterways, in controlling erosion and seepage. More than 1,250,000 sq. ft. are now in use throughout the West, Southwest, and in Mexico. Installations range from small farm laterals to a 75-ft.-perimeter canal; from farm ponds to large industrial reservoirs. The linings have been used as an economical replacement for rip-rap in controlling wave-action erosion on the slopes of levees, reservoirs, and dams.

A natural gasoline plant in Texas, after two successive disappointments with other materials, utilized 197,000 sq. ft. of the material in waterproofing the floor and sides of a reservoir measuring 700 by 250 ft. A crew of 20

men, working 14 days, completed the installation. Ten months after installation, no seepage whatsoever was recorded by the evaporation pits, set up under U. S. D. A. standards.

The linings can be installed with equal ease on a small irrigation lateral and on extremely large canals. The $\frac{1}{2}$ -in. thickness and the factory applied protective coating make a covering backfill unnecessary; only the edges of the lining over the berm of the canal need be covered.

Very recently, 30,000 sq. ft. of linings were installed in a large irrigation canal project under the direction of the Mexican government. An additional order, for 200,000 sq. ft., has been delivered to Chetumal, Mexico, to be used in lining the floor and sides of a drinking water reservoir, another project of the Mexican government.

Proven durability

Durability and longevity appear well established. An installation on a West Texas farm has undergone cattle traffic, movement of adjacent earth, wide climatic changes, and a flood over a 2-yr. period without significant effect on the lining. An installation made near Phoenix, Arizona, withstood 140-deg. ground temperatures during a summer without noticeable effect. At Fallon, Nevada, sub-freezing temperatures over prolonged periods produced no negative indications.

Based on these and other experiences developed out of numerous installations, the linings have earned the respect of engineers and conservation authorities for use in controlling erosion and seepage. One indication of this is the fact that they have been approved for use under the Production Marketing Administration program.

construction, welding being used for all outside beams and columns, and high strength bolts at interior locations. Steel will be furnished by Consolidated Western.

The prime contractor, Dinwiddie Construction Co., is represented on the job by Grant Beery, superintendent, with Jack Meehan as his assistant. Al Hook is carpenter foreman for Dinwiddie, and Roy Hall is job runner.

Most of the activity on the site to date has been provided by the Raymond Concrete Pile organization, headed by Boyd M. Begg, superintendent. His assistant is Ray Weaver, and these two men split the work of supervision now that the pile driving operation has gone on a 2-shift basis. D. R. Sandstrom is job clerk.

For the first shift, Carl Bergstrom is foreman, Ira Jones is engineer, and Edmund McCullough is fireman. The crew includes Maurice Bourgoin, Pete Franco, Charles Lowe, Albert Schug, and Thomas Stratton. The second shift has James Whitmore as foreman, Clarence Vivion as engineer, and Kurt Blyler as fireman. Men on the second shift crew are Thomas Hortman, Marshall McCoy, Hugh MacDonald, Joseph Tirado, and George Whitman.

The steel handling crew for Raymond is headed by Carty Freese and Jim W. Dykes. James Burnett is welding foreman, and the crew includes Carroll Cooper, Charles Cannon, Frank Granger, and Michael Sklorenko.

DAVITS for handling 65-ft. steel pile lengths were designed by Carl Cramer, Raymond district superintendent. Boyd Begg, project superintendent, checked design by building a scale model. Both the model and the real thing work fine!



Engineers study possible Continental Divide bore

COMPLETE REPORTS on the engineering practicability and the economic feasibility of drilling a tunnel under the Continental Divide, west of Denver, are being made for Chief Engineer Mark U. Watrous of the Colorado Department of Highways. A proposal to drill such a tunnel for highway traffic has been a major point of discussion in the state for many years.

In 1941 a pioneer bore, drilled under Loveland Pass for about 5,400 ft. at a cost of \$300,000, revealed that there was "bad rock" for a considerable distance inside the bore where it came through the Continental Fault.

Bids were asked in 1947 on the drilling of 2,000 ft. of the tunnel, but only one bid was received and, because of state and Bureau of Public Roads regulations, it could not be opened. Again in 1947, bids were asked on drilling the same footage, but no bids were received despite extensive nationwide advertising.

Public opinion demands action

Since that time much agitation, principally from the Western Slope of Colorado, has been building up. At its session early in 1953, the state legislature directed the Department of Highways to make a thorough study of the tunnel problem.

With approval of the Colorado Highway Commission, Chief Engineer Watrous employed the engineering firm of Singstad and Baillie of New York, which designed the Holland Tunnel, to make a thorough study of the engineering phases of a tunnel under the Continental Divide. This study is to include a report on feasibility, total cost, and other phases of the problem.

At the same time, the Kansas City firm of Howard, Needles, Tammen and Bergendoff was employed to study the economic phases of the tunnel proposal. The report from this firm will include the probable traffic volume; whether a toll operation is feasible; the necessary tolls under such a plan; and the possibility of a state bond issue. This same firm made similar studies in connection with the Denver-Boulder Toll Road, which has proved to be even more successful than the most optimistic of early estimates.

Four possible sites

Both Ole Singstad and David G. Baillie, Jr., who have made extensive personal investigations of all possible tunnel sites west of Denver, are now compiling their reports. The four possible sites they have selected, together with pertinent data, follow:

1. The Loveland Pass tunnel, elevation, 11,236 ft.; length of bore, 5,418 ft.; with 3.5 mi. of approach highway required.

2. Straight Creek, elevation, 11,240 ft.; length, 7,221 ft.; with 11.6 mi. of new construction on approaches.

3. Jones Pass, elevation, 10,980 ft.; length, 9,852 ft.; and 24.2 mi. of new construction. There is also a slide area on the west on this route, which enters the Williams River mountain area on the western portal of the tunnel.

4. Devil's Thumb Pass area, which Watrous said was not the most feasible route in that area. He recommended instead a route to the south, about a mile north of Corona Pass. Elevation would be 11,228 ft.; length, 5,718 ft.; and 12.5 mi. of new highway construction would be required from Nederland to the East Portal, and 13.6 mi. from the West Portal to Fraser.

Estimates on approach roads for the various sites are being prepared by the Department of Highways. Investigation of the tunnel sites, in addition to the usual ground work, has included extensive drilling, aerial mapping, and topographic photography.

New hydro plants up Colorado project power

POLE HILL power plant was the first of a series of new hydroelectric plants which recently started to operate on the Colorado-Big Thompson Project. Power from this new plant, with a single 33,250-kw. capacity generator, was followed a few weeks later by operation of the 31,500-kw. Unit No. 1 of the 3-unit Flatiron power plant. The second and third units of the Flatiron power plant were expected to be producing electricity this month.

The third unit of the Flatiron power plant has a unique arrangement as a reversible pump turbine unit. During the non-irrigation season this unit can pump water into Carter Lake reservoir. Later, during the growing season when the water is needed for irrigation, the process is reversed and the water flows back through the unit which then operates as a generator. As a pump, the unit will have a capacity of 16,600 gal. per min.; as a generator it will produce 8,500 kw. of electricity.

The new plants will bring the total installed capacity of the Colorado-Big Thompson Project to 179,000 kw.

Development of the Upper Colorado Basin

A REPORT on proposed development of the Upper Colorado River Basin has been submitted to the President, and through him to Congress, for approval by Secretary of the Interior Douglas McKay. Substance of the report, which has also been submitted to other federal agencies and affected states for their comments, follows:

The Colorado River Storage Project is a plan conceived by the Bureau of Reclamation in cooperation with the five states of the Upper Colorado River Basin to enable them to utilize their apportionment of Colorado River water. It anticipates the irrigation of 380,000 ac. of lands, consumptive use of water for industrial and municipal purposes, and the generation of large blocks of hydroelectric power and other benefits in the states of Wyoming, Utah, Colorado, New Mexico, and Arizona.

Initial cost given

The initial recommended phases of the project, which includes 3 storage dams and reservoirs and 13 participating irrigation projects, are anticipated to cost \$1,134,643,000. This construction, although proposed for authorization at one time, would be staggered over a considerable number of years.

Most pressing need for the Upper Basin states is a considerable amount of reservoir storage space in order to assure delivery to the Lower Colorado River Basin of 75,000,000 acre-feet of water in any 10 consecutive years as contemplated by the Colorado River Compact. This storage space will enable the Upper Basin States to conserve flood waters in years of heavy precipitation for use during the inevitable years of drouth.

To meet this situation, the plan calls for total active reservoir storage space of 37,530,000 acre-feet. Revenue from the sale of this energy would repay the entire Federal investment allocated to power as well as a major portion of the cost of the irrigation development.

Glen Canyon is largest

The initial development recommended by Secretary McKay for authorization at this time includes 3 of 10 possible large storage dams and reservoirs and 13 participating water development and utilization projects.

The largest single element in this plan is the Glen Canyon storage and power dam and reservoir, approximately 13 mi. upstream on the Colorado River from Lee's Ferry, which is the dividing point between the Upper and Lower basins. It will be the final regulating and storage res-

ervoir in the upper basin and will be a 26,000,000 acre-foot capacity reservoir behind a dam 580 ft. above river bed. The Glen Canyon power plant will have 800,000 kw. installed capacity. This unit is estimated to cost \$421,300,000.

Also recommended for the first authorization is the Echo Park Dam on the Green River just below its confluence with the Yampa, in northeastern Utah. This dam would be 525 ft. high, store 6,460,000 acre-feet of water, and have 200,000 kw. of installed power capacity. It would cost \$176,400,000.

Nature lovers opposed

"The opposition to the two dams in question," Secretary Ralph Tudor reported to Secretary McKay, "arises from persons and organizations interested in the national parks and their desire to preserve the Dinosaur National Monument in its present natural state. The Echo Park Dam, in particular, will create a large reservoir within this monument and will certainly alter its appearance and existing conditions.

"It should be noted that neither of these proposed reservoirs will inundate any portion of the quarry where the dinosaur skeletons have been found."

Secretary Tudor said he had considered the New Moab, Dewey, and Desolation dam sites and also the possibility of increasing the height of the proposed Glen Canyon Dam. Any of these alternates, he said, show a net loss from evaporation of not less than 100,000 to 200,000 acre-feet a year. He pointed out that even the lower figure would provide all the domestic, commercial, and industrial water for a city the size of Denver.

Water conservation prevails

"I share the concern of those who would preserve the beauties of the Dinosaur National Monument in their present natural state," he advised Secretary McKay, "but as between a choice of altering this scenery without destroying it in a basin which is and will remain rich in scenery, or the irreplaceable loss by evaporation of enough water to supply all the needs of a city the size of Denver, I believe the conservation of the water in the interest of the Nation is of greatest importance."

The participating units of the project recommended for authorization at this time are:

Central Utah (initial phase), Utah	\$231,044,000
Emery County, Utah	9,865,500
Florida, Colorado	6,941,000
Hammond, N. Mex.	2,302,000

LaBarge, Wyoming	1,673,000
Lyman, Wyoming	10,564,000
Pine River Extension, Colorado-N. Mex.	5,027,000
Seedskadee, Wyo.	23,272,000
Silt, Colorado	3,356,000
Smith Fork, Colorado	3,367,000
Paonia, Colorado	6,944,000
Eden, Wyoming	7,287,000
Shiprock (Indian) division of Navajo project, including Navajo Reservoir and canal capacity for South San Juan Division	225,300,000

The Eden Unit is already authorized and under construction as a separate project, but is proposed to be included in the over-all development.

Shakeup proposed for Arizona Highway Dept.

AFTER SOME EIGHT months of study into the organization and practices of the Arizona State Highway Commission, a committee composed of six members of the state legislature has come up with a series of conclusions and recommendations.

Among the major recommendations proposed by the committee was a suggestion to divide the state into seven districts, with one commissioner to be appointed from each district to a new Highway Commission by the governor for staggered, five-year terms. The present commission is composed of five members.

Another earnest recommendation of the committee was that a reorganization of the Highway Department should take place as soon as possible.

The new Commission would be the policy-making body of the Department, would prescribe rules and regulations, approve budgets, and appoint the Director of the Department. This Director would have full authority and responsibility for the general operation of the Department, subject only to the Commission, which could remove him by a two-thirds vote.

A conclusion that the present highway system is in need of improvement, as indicated by sufficiency rating reports, was reached by the committee, which recommended that such reports be used to determine the priority given to new construction and reconstruction of roads.

Finally a recommendation was made that a modern merit system should be established in the Department so that employees could be offered reasonable job security but still could be discharged for reasonable cause.

ARIZONA

ARIZONA AIRPORTS—Lots of construction activity is scheduled for various airports in the state. Congress has authorized \$2,285,000 for expansion of facilities at Yuma County Airport. This will include paving of the airfield, construction of fuel storage tanks and utilities, shop expansion, and some land acquisition. Another \$1,376,000 is tabbed for additional airfield paving and construction of communication, maintenance, and storage facilities at Davis-Monthan Air Force Base near Tucson. Luke Air Force Base has been allotted \$1,005,000 for additional runway and apron paving. All of these projects have been authorized previously and will be paid for out of funds already appropriated.

Improvement of facilities at Phoenix's Sky Harbor Airport was forecast when the City Council called for bids on a parking garage and service station there.

TRAFFIC HAZARDS on the Phoenix-Tempe Highway were scheduled to be reduced considerably with the opening of the new traffic interchange west of Tempe Bridge early in January. The project is a combination over- and underpass with separated lanes. The three-span steel girder structure cost \$176,075 to build.

SHOW LOW LAKE—The \$1,500,000 dam built by Phelps Dodge at Show Low, Ariz., to provide its Morenci Plant with 5,000 acre-feet of water annually as well as to give sportsmen another place to fish, has impounded enough water to raise the

level 35 ft. above creek bottom. The dam will hold enough water to raise the lake's level a maximum of 70 ft.

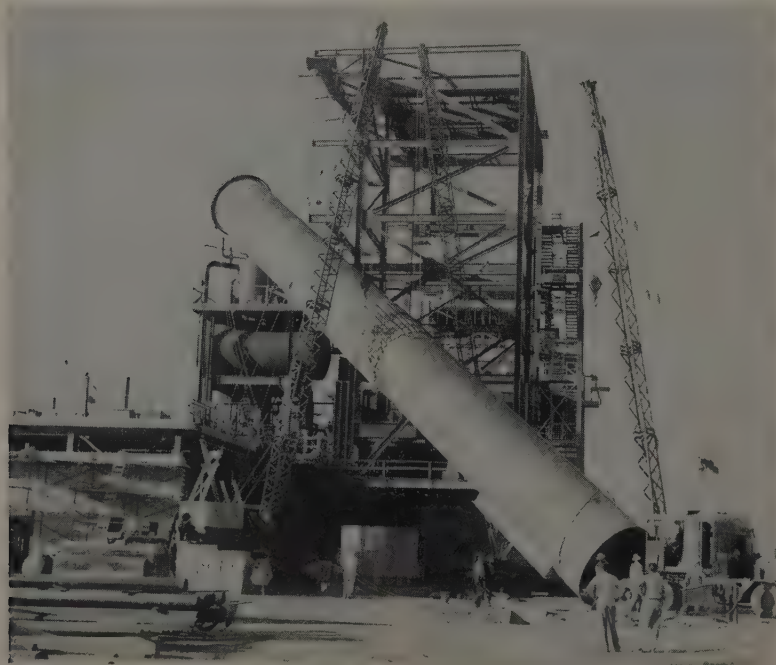
LATEST REPORTS indicate that the new wing of the Good Samaritan Hospital in Phoenix is about ready for use. The \$1,000,000 addition was erected by the T. G. K. Construction Co., Inc.

MARDIAN CONSTRUCTION CO. has started work on a one-story, 74 x 86-ft. office building for the Arizona Power Authority Commission in Phoenix. Mardian's low bid on the job was \$95,960.

FISHER CONTRACTING CO. of Phoenix, was awarded a \$1,318,000 contract for runway and taxiway construction at Luke AFB. Completion is expected in August 1954. Award for building 44.5 mi. of 115-kv. transmission line from Davis Dam went to Elliott Construction Co. of Omaha, Neb., on a bid of \$427,950.

IT TAKES THREE CRANES TO LIFT THIS STACK

This 30-ton steel exhaust stack is being lifted into place at the new \$10,000,000 addition to the Kyrene Steam Plant near Tempe, Ariz. The stack, which is 120 ft. tall and 11 ft. in diameter, is made of six sections, varying in thickness from $\frac{3}{8}$ to $\frac{1}{4}$ in., welded together flush from the outside. The stack, fabricated and erected by Consolidated Western Co. of Phoenix, is held in place by twenty $1\frac{1}{2}$ -in. base ring bolts. The plant is being built by Bechtel Corp., with Marty Akeyson superintending construction. Al Patch is coordinating engineer from the Salt River Power District and J. W. Lawler, Consolidated Western chief construction engineer, supervised erection of the stack.

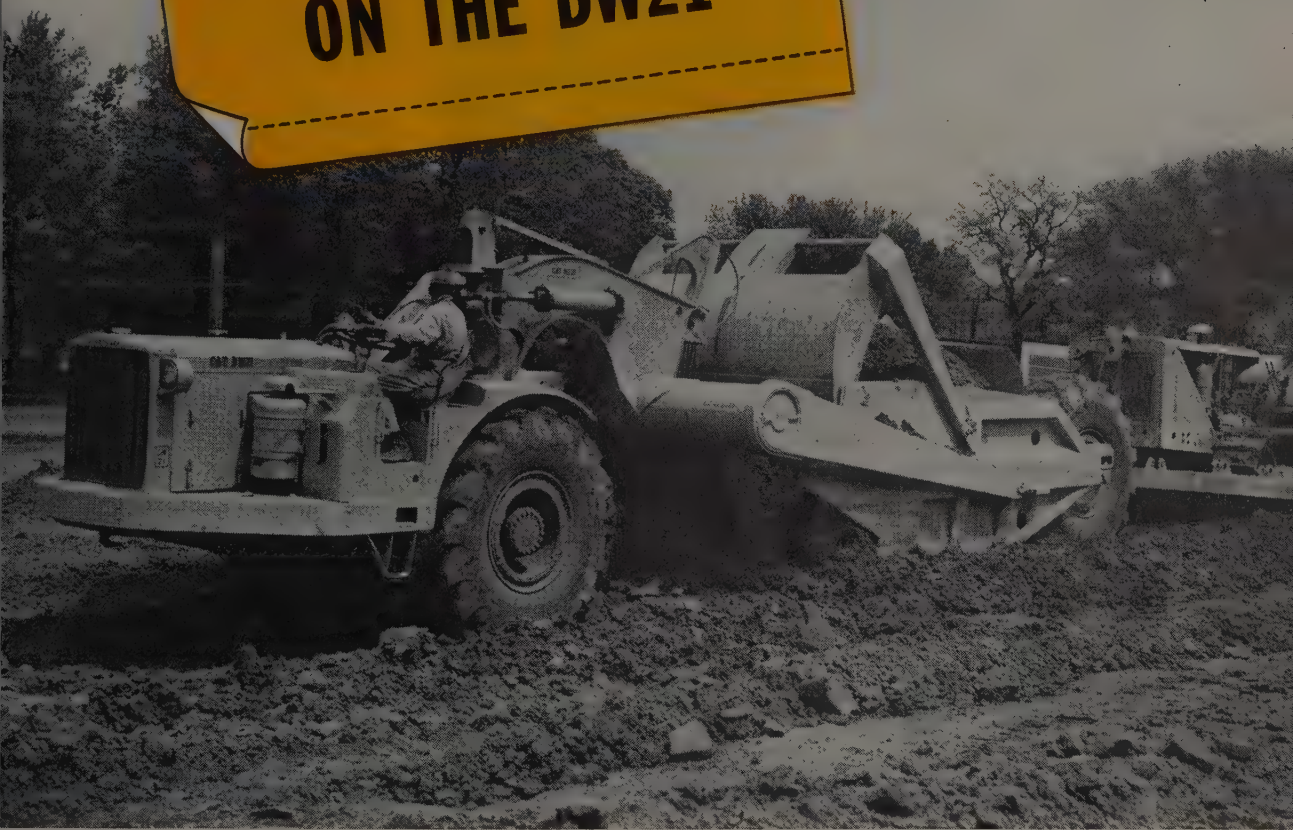


CALIFORNIA

MILITARY CONSTRUCTION projects in Northern California have been allocated almost \$10,000,000 by a Senate committee. Projects included are \$4,360,000 for work at Treasure Island, \$772,000 for work at the Sierra Ordnance Depot at Herlong, \$1,520,000 for work at Mather Air Force Base near Sacramento, \$162,000 for work at Hamilton Air Force Base near San Rafael, \$1,439,000 for work at Castle Air Force Base near Merced, and \$37,000 for work at Travis Air Force Base near Fairfield.

BIGGEST REAL ESTATE DEAL in the history of Contra Costa County was completed when the Utah Construction Co. paid more than \$4,000,000 for 5,020 ac. of rolling valley land in the eastern part of the county. The firm plans to spend at least \$140,000,000 over a 10-yr. period in developing a self-sufficient community capable of supporting a population of 30,000, according to Richard F. Weske, construction engineer for the company. Homes to be built in the development will range in price from \$10,000 to \$50,000. One reason for the purchase, Weske said, was the fact that the new development lies di-

A USER'S REPORT ON THE DW21



THE USER: A. L. Alley & Son, Faribault, Minnesota.

THE JOB: Relocation of U. S. No. 61 at Red Wing, Minn., where two Cat® DW21 Tractors with No. 21 Scrapers were working with other equipment in wet, sticky conditions on an earthmoving assignment of 300,000 cu. yds. Loading was in wet shale with favorable grade. The going on the ¾-mile haul was good to soft, with 3% adverse grade in the cut. The fill area was soft.

PRODUCTION: Working 9-hour days, the DW21s averaged 900 to 1000 pay yards a day per unit. Loading time with pusher: 1 to 1½ minutes. Running time on the haul: 2¾ minutes. Average cycle time: 8¾ minutes.

Report from the user, Superintendent L. Parker speaking: "With the performance of our DW21s to date, we would say they are the best machines of the rubber-tired class we have ever owned. Those large tires are a big advantage loading the shale, on the haul road and in the soft fill. The rigs are powerful, fast and easy to handle. Their superior performance caused us to buy three additional such machines for another job running south of Red Wing, Minnesota."

There are the facts. Like Mr. Parker, other users report you can't beat this rugged yellow earthmover for big production on long hauls. There are lots of reasons—here are a few: the DW21 is the only two-wheel earthmover designed and built by one manufacturer. Every part is matched for maximum efficiency. Another exclusive: only the DW21 has the rugged, safe triangular hitch which gives wide bearing space and four-point load distribution.

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rectly in the path of the proposed Shepherd Canyon tunnel, which will give direct access to the San Francisco Bay area communities.

PLENTY OF POWER PROJECTS

—Pacific Gas & Electric Co. plans to spend \$170,000,000 during 1954 on various power projects capable of producing a total of 907,000 kw. Individual installations in this total will include the Poe project on the Feather River, Butt Valley in Plumas County, Belden in Plumas County, Caribou in Plumas County, Pit No. 6 and 7 on the Pit River in Modoc County, and a steam plant in Humboldt County.

FINANCING of the Los Angeles Municipal Water System construction program for the 1953-1954 fiscal year is being carried on by sale of a \$9,000,000 water revenue bond issue, which, together with current revenues and bond funds on hand, will meet the cost of a \$17,000,000 con-

struction program of building reservoirs, trunk lines, wells and pumping plants, distribution mains, and installation of new service connections and meters. The number of active water services provided by the system has increased more than 50% over a 10-yr. period, according to Samuel B. Morris, general manager of the utility.

BAY BRIDGE BACKERS TRY AGAIN

—California's Department of Public Works has revised its application for Army approval of its plans for a proposed highway crossing of San Francisco Bay from the vicinity of Army and Third Streets in San Francisco to Bay Farm Island in Alameda County. The revised application, which provides for the bridge to curve around the southerly end of the Alameda Naval Air Station restricted area, has been approved by the Navy. The proposed structure would consist of open-span type causeways from each side of the Bay

to a tube under the navigation channel with sand islands at the end of each tube. The navigation channel would provide a minimum depth of 50 ft. at mean lower low water for a horizontal distance of 1,500 ft. normal to the channel. The causeway span would provide minimum horizontal clearance of 40 ft. The easterly approach would consist of a mole extending from Bay Farm Island for a distance of not more than 8,000 ft. Estimated cost of the project ranges between \$250,000,000 and \$300,000,000.

SUNSET BLVD. BRIDGE

—Construction of an \$800,000 bridge to carry Sunset Blvd. over the proposed Sepulveda Freeway will start soon after the contract is awarded, probably by July, according to Paul O. Harding, state highway district engineer. The project, which will probably take about a year to finish, includes the major bridge, a grade separation bridge, and two ramp bridges.

HARBOR FREEWAY

—Work on a 3-mi. section of the Harbor Freeway near San Pedro is expected to begin early this summer, according to the Division of Highways. The project, to cost about \$4,650,000, includes construction of eleven structures.

SACRAMENTO MUNICIPAL UTILITY DISTRICT

president, Royal Miller, outlined plans for a proposed 180,000-kw. hydroelectric and water development project on the Upper American and Rubicon rivers in California. Permits for water rights in the area have been applied for previously by the utility. The project, expected to cost about \$80,000,000, includes four power plants: Union Valley, 15,000 kw.; Jaybird, 77,000 kw.; Camino, 52,000 kw.; and White Rock, 45,000 kw. Plans were prepared by Frank E. Bonner, San Francisco consulting engineer, and Paul E. Shaad, SMUD's chief electrical engineer.

CITIZENS of San Diego will be able to use their new library soon. The concrete and steel building is being erected by F. E. Young Construction Co. under a \$2,169,150 contract.

WALSH CONSTRUCTION, CO.

suffered a loss on its Pit 4 Tunnel job when Everett H. Hatch, project manager, died December 10. A native Westerner, Hatch had been associated with construction projects in the region almost exclusively since his graduation from Stanford University in civil engineering in 1908.

His career included highway, utility and shipbuilding construction, but his most notable work was in hydraulics, particularly in the field of tunnel driving. Hatch spent 7 yr. in engineering with P. G. & E., mostly on hydro

Folsom Dam progress report: 65% complete

FOLSOM DAM on the American River in California was about 65% complete on the first of the year despite several unexpected setbacks (*Western Construction*—Aug. 1953, p. 97; Sept. 1953, p. 98), and the scheduled completion date of early 1955 may not be too far off. The first season of full operation of the completed project is expected to be in 1955-56.

Earthwork on the wing dams is keeping up with concrete pouring in the main dam, the construction trestle is nearly complete, and the concrete section is high enough so that eventual failure of the present cofferdam will not matter. Additional rock ex-

cavation, made necessary when a fault was discovered under the left abutment (*Western Construction*—Sept. 1953, p. 63), has been finished.

Completion of the earth wings and placement of the mass concrete will be the major objectives for 1954. Bids for grouting the earth portions will be advertised in January and drilling and grouting work from the galleries in the concrete river section will be let out to bid in May.

Corps of Engineers personnel on the job include Charles F. Beatie, project engineer; William G. Clark, earth work; Sam D. Burks, concrete; and John deArieta, office engineer.

CONCRETE BLOCKS rise from the American River to form Folsom Dam, which will attain a maximum height of about 340 ft. Gross length of the project, not counting intervening hills, is more than 23,300 ft.



construction in the Sierra Nevada, but his longest affiliation was with Walsh Construction Co.—20 yr. During that time he superintended tunnel work on the Metropolitan Aqueduct in Southern California, at Fort Peck Dam in Montana, a portion of the Delaware Aqueduct in New York, and four P. G. & E. projects: Electra Tunnel, Rock Creek Tunnel, Bear River Tunnel, and the recent record breaker, Pit 4 Tunnel.

TAINTER GATES at Whittier Narrows Dam will be furnished and installed by Guy F. Atkinson Co. of Long Beach. Low bid for the job was \$994,480. Dan Caputo of San Jose was awarded a contract to build part of a steel bridge and 2 mi. of approaches in Sacramento County on his bid of \$1,199,100. Zoss Construction Co. of Hollywood bid \$1,951,900 and got the award to build Pacoima Junior High School in Los Angeles.

COLORADO

COLORADO'S Highway Department has advertised for bids on road projects at an estimated cost of more than \$900,000. Projects included in this total are 4.3 mi. of U. S. 85-87 between Monument and Colorado Springs, 3.5 mi. of construction on State 192 near Lamar, 3.5 mi. of grading and asphalt surfacing on State 374 in Rio Grande County, and 2.1 mi. of stabilization, asphalt surfacing, and structures on State 368 near Estrella.

THE AIR TERMINAL building at Peterson Field, east of Colorado Springs, has been completed at a cost of \$300,000.

PRESTRESSED BRIDGE IN DENVER—The first prestressed concrete bridge in the Rocky Mountain area is scheduled for completion early in 1954, according to Dewey Wright, city engineer. Main section of the bridge contains 24 prestressed concrete girders, each 50 ft. long and weighing 40,000 lb. A test load of 72,000 lb. of pig lead, representing the heaviest load expected to come on the bridge, resulted in a sag of about ½ in. The bridge is being built at a cost of \$127,450 by C. M. Hanes Construction Co. of Denver.

CONCRETE MEETING—The American Concrete Institute will hold its golden anniversary convention at Denver February 22 through 25. Speakers scheduled to address the convention include Rear Admiral Joseph F. Jelley, director of construction for the Department of Defense; W. A. Dexheimer, Commissioner of the Bureau of Reclamation; Major



HERE'S THE FINISHED PRODUCT

Starting on page 62 in this issue is a story about the construction of the above beef exhibit barn, built with precast, prestressed roof girders and purlins by Peter Kiewit Sons' Co. in Los Angeles. Picture was taken on opening day of Great Western Livestock Show.

Gen. Samuel D. Sturgis, Jr., Chief of Engineers of the Army; and Norman P. Mason, chairman of the construction and civic development department committee of the U. S. Chamber of Commerce.

BRIDGE BOTTLENECK BROKEN—Residents of Glenwood Springs, Colo., whooped it up when a ribbon across the new \$500,000 highway bridge which spans the Colorado River was cut and the bridge was opened to traffic. The old bridge had been a traffic bottleneck because of its narrow roadway.

WHEN Grant Junior High School in Denver, Colo., was dedicated to use, it replaced a building that was erected in 1891. The new structure was built at a cost of \$1,278,790. Gordon D. White was the architect.

LOW BID for 8½ mi. of grading and surfacing State 92 in Delta County was submitted by J. H. & N. M. Monaghan Construction Co. of Derby.

POPULATION PRESSURES demand that at least \$8,500,000 should be spent to provide new buildings and facilities at the University of Colorado campus at Boulder during the next 10 years, according to university officials. Even then the institution will be forced to turn away many students because of lack of room, they predicted. Another indication of

growing population came when plans were filed with the Denver Building Department for construction of a \$1,250,000 church to measure about 154 x 150 ft.

IDAHO

IDAHO TUNNEL—The 8,500-ft. long Star tunnel connecting mines of the Sullivan and Heckla Mining Companies has been holed through after 10 months of work. Purpose of the bore, which measures 10 x 11 ft. is to eliminate hoisting in the Heckla shaft, eliminate pumping of 100 gal. of water yearly from the Heckla shaft, enable the men to get to the working faces of the mine faster, and to improve ventilation.

FLOOD CONTROL revetment levees on the Clearwater River near Ahsahka, have been approved by the Corps of Engineers. Cost of this construction, which covers 2 mi. of work along the river banks, is about \$148,500.

THE CONSTRUCTION PROGRAM at Mountain Home Air Force Base in Idaho was substantially completed by the obligation of \$2,343,000 for construction projects on the first of the year. This brings the total cost of the project to about \$19,000,000, according to a military construction subcommittee of Congress.

STATE TO FEDERAL—The Idaho Highway Board has deferred action on a request to designate State 25 from Rupert to Bliss as U. S. 30 North until additional work on that route has been completed. The Board was informed by Earle V. Miller, State Highway Engineer, that the Atomic Energy Commission had allocated \$791,000 to construct three small bridges and seal coat the road from the intersection of U. S. 26 to Idaho Falls.

BOISE RIVER COOPERATION—For the first time, the Bureau of Reclamation and the Corps of Engineers have agreed on joint operation of three reservoirs on the Boise River in Idaho in order to get maximum benefit in flood control, irrigation, and power development. The plan, which will become effective when it has been approved by the interested water users organizations and when Congress approves the revised allocation report which makes it possible, covers operations at Lucky Peak, Arrowrock, and Anderson Ranch dams. The operating plan will have the three reservoirs managed as one system, with water storages and releases based on

a forecast of the runoff in the water sheds above the dams.

AWARD for surfacing 11 mi. of Sawtooth Park Highway in Salmon National Forest went to Aslett Construction Co. of Twin Falls on a bid of \$113,765. Low bid for improvement and extension of Willow Creek Wasteway on the Boise Project was submitted by Marshall & Haas of Belmont, Calif.

MONTANA

NOXON RAPIDS on the Clark Fork River in Sanders County, Mont., will be the site of a dam to be constructed by Washington Water Power Co., according to Kinsey M. Robinson, president of the company. About \$100,000,000 will be spent for facilities to generate 350,000 kw. of power there during the next 10 yr., he said.

SEEK SUBSTITUTE SPAN—Citizens of Libby, Mont., are up in arms about the condition of a narrow, 41-yr.-old bridge across the Kootenai River at Libby. The State Highway Department says it can't build a new bridge without federal aid, and the U. S. Bureau of Public Roads says it seems inadvisable to grant federal aid for a new bridge because the highway department plans to repair the old bridge. The citizens just want somebody to do something soon.

COME SPRING, preliminary designs and engineering for construction of a 1,300-mi. oil pipeline from Poplar, Mont., to Chicago at an estimated cost of \$130,000,000 should be ready, according to J. H. Aronson, Governor of Montana. A committee made up of representatives of the major oil companies which have wells in the Williston basin has commissioned the Shell Pipeline Corp. to move the oil, the Governor said.

RAISING THE ROOF—The lift-slab technique for raising concrete roofs is now being used in the Pacific Northwest. The Northwest Lift Slab Corp., headed by James J. Breen, used this method of placing the roof on the new \$400,000 Roosevelt High School in Missoula. This process, in which 50-ton hydraulic jacks are mounted on steel H-beams and are operated from a central control panel, is fully described in *Western Construction*—March 1953, pp. 71-73.

DAM SITE SOUGHT—Construction of the authorized multi-purpose Libby Dam project on the Kootenai River 15 mi. upstream from Libby, is favored by the Army Corps of Engineers, according to Col. N. A. Mat-

thias, Seattle district engineer. Authorization for the dam, at a different site, however, was given by Congress in the Flood Control Act of May 1950. The new site would avoid heavier railroad and highway relocations and have no adverse effect upon import industries, the Colonel said. The project would cost \$263,321,000 for a dam 400 ft. high. Maximum power generation capacity would be 800,000 kw. Since the reservoir would back up into Canada, approval of the International Joint Commission on Water Resources must be obtained before construction can start.

AWARD FOR GRADING, surfacing, and filling 13 mi. of highway in Powder River and Carter counties went to Northwestern Engineering Co. of Rapid City, So. Dak., on a \$523,790 bid. Completion date is October 15, 1954. Nilson-Smith Construction Co. of Great Falls received a \$318,120 contract for 11.7 mi. of grading and surfacing in Toole County. Completion date is September 15, 1954.

NEVADA

NEVADA IMPASSE—Plans of the Nevada State Highway Department to reconstruct 10 mi. of U. S. 95 south of Fallon ran up against a legal barrier in a right-of-way suit when a split decision by the court ruled out the state's move to gain immediate entry to the property in question. The court, however, pointed out how the state might present a new motion for immediate entry which would be legal. This would include posting a bond for twice the value of the property while condemnation proceedings or negotiations continued.

PIPELINE ACROSS THE COLORADO—The Nevada Natural Gas Pipeline Co. has asked the Corps of Engineers for permission to build a suspension-type pipeline crossing over the Colorado River $2\frac{1}{2}$ miles upstream from Needles, Calif. The structure will have a minimum horizontal clearance between piers of about 475 ft. and a minimum vertical clearance of 35 ft. above water level when the flow is 40,000 cfs. Decision on issuing the permit will depend upon how much the proposed work will interfere with navigation.

ELKO COUNTY plans to construct 8 mi. of secondary road from the Carlin Bridge across the Humboldt River to the Eureka County line in 1954, according to George Ogilvie, county commissioner.

RENO ROADS—City officials of Reno and representatives of the State Highway Department had a confer-

ence with Southern Pacific Railroad Co. executives and W. H. Smith, Bureau of Public Roads district engineer, in order to try to buy property from the railroad to widen U. S. 40 in Reno.

ALTHOUGH the citizens of Fallon voted in favor of issuing \$240,000 worth of bonds to build a sewage disposal plant in December, actual construction cannot begin until next fall, according to Lloyd Whalen, city engineer. The reason is, he said, that drawings of the plans and specifications will take about six months. Brown & Caldwell, San Francisco consulting engineering firm, will be given the job of designing the plant.

NEW MEXICO

A CONTRACT EXTENSION of three months has been requested by Allison & Haney on its \$1,500,000 job to build a 15-mi. water line from Duranes to Albuquerque. The project was slowed down by delay in the delivery of materials, according to A. J. Haney of the contracting firm, but the main reason for the extension request was to give plenty of leeway for testing, he said.

ROAD REQUEST—A delegation of western New Mexico residents met with W. J. Keller, U. S. Bureau of Public Roads district engineer, and Robert Anderson, BPR program engineer, to talk about building a road from Fence Lake to U. S. 60. Members of the delegation were told to present their problem to their county planning committees and to agree on priorities and location of the road.

BOTH the Albuquerque City Commission and Southwest Engineers, the city's consulting engineering firm, are in favor of a new \$600,000 city revenue bond issue to build a release sewer trunk and reservoir. The engineer's estimate for the cost of the two projects listed \$220,000 as the reservoir cost and \$436,330 as the sewer cost, with an \$87,000 advance section already financed. The sewer is needed to take the overload off the present main sewer trunk, and the reservoir is needed as a settling basin to keep sand out of the 15-mi. water main now being constructed.

LEAKY SEWER—There's been a lot of commotion down in Albuquerque recently about a new sanitary sewer, still under construction, which is being infiltrated by an excessive amount of groundwater, according to Southwest Engineers, the city's engineering consultant on the job. F. D. Shufflebarger holds the \$843,050 contract. The situation is getting better,

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however. E. O. Betts, the city engineer, said that new tests on the sewer indicate that only about 1,200 ft. of the line need to be tightened to correct the infiltration.

TOURIST TRANSIT—The City of Rocks, designated a state park by the New Mexico legislature, is to be converted into a tourist attraction. Plans are being made to improve an access road leading to the area, which is midway between Silver City and Deming.

WESTERN MACHINERY CO. of San Francisco, Calif., announced that its Western-Knapp Engineering Division has been awarded a \$3,000,000 contract to design, build and equip a plant to treat uranium-bearing ore at Shiprock, New Mex., which is about 93 mi. north of Gallup. Low bid on a USBR project for earthwork, clearing, and structures on the Middle Rio Grande Project of New Mexico was made by D. D. Skousen & Son of Albuquerque, New Mex. The bid was \$271,287.

OREGON

BONNEVILLE POWER ADMINISTRATION has scheduled some \$11,125,000 in contract construction awards for 1954. This includes 51 mi. of right-of-way clearing, 372 mi. of transmission line construction, 11 new substations and additions to 15 substations.

PORTLAND INTERCHANGE—Construction of a traffic interchange, to cost an estimated \$700,000, in Portland, is scheduled for 1954, according to R. H. Baldock, State Highway Engineer. This structure is intended to relieve traffic congestion on Harbor Drive by increasing the drive's carrying capacity to 90,000 vehicles.

PEAK ELEVATION of 340 ft. was reached at McNary Dam Reservoir on the Columbia River early in December. The filling began in April (*Western Construction*—July 1953, p. 118). The 38,000-ac. lake will be held at peak elevation until February, when power production will cause a drop, according to Col. F. S. Tandy, Walla Walla district engineer.

WATER WANTED—Kenwood Water District of Medford, Ore., approved a \$43,000 bond issue to provide facilities so water could be obtained from the Medford municipal system.

CASCADE-AUSTIN Construction Co. has completed 5 of the 25 piers which will support the new Oregon-Washington bridge being built over



ROUGH GRADING THROUGH OREGON'S FORESTS

Pushing the Pacific Highway (U. S. 99) through Oregon's forests calls for a lot of dirt moving. Babler Bros. completed the Anlauf-Elk Head Road section shown here late in October 1953 at a cost of about \$1,125,000.

the Columbia River at Umatilla. Bob Austin, construction superintendent on the job, says that the 300-day deadline will be met easily, if the work continues at the same rate it has been going.

THE WILLAMETTE BASIN Project Committee has asked Congress to appropriate money to plan two dams on tributaries of the Willamette River. One would be on Cougar Creek on the South Fork of the McKenzie River. The other would be called Green Peter Dam, located on the Santiam River. Added support to the Cougar Dam proposal came from the Oregon Division of the Izaak Walton League of America, Inc., which passed a resolution at its December convention favoring earliest possible construction of the dam.

LOW BID for completion of excavation for powerhouse main bay units at The Dalles Dam was submitted by Guy F. Atkinson Co. and Ostrander Construction Co., Portland. The sum was \$18,886,000. Berke Bros., Portland, and C. R. O'Neil were low at \$1,515,560 for grading 15 mi. of the Old Oregon Trail in Umatilla County.

UTAH

CONSTRUCTION on Salt Lake City's new sewage pumping plant is about 31% complete, according to Roy W. McLeese, city engineer. The plant is being built by the Davis and Butler Construction Co., at a cost of \$594,000. Completion date for construction of the plant, which will have a daily capacity of 25,000,000 gal., is

February 20, 1955. Meanwhile, action to relieve overloading of existing sewers in the city came when the City Commissioners approved construction of a supplemental sewer which will cost about \$99,000.

EMPTY COFFERS—State institutions will have to wait until the end of the first quarter of 1954 for any further building funds, according to the State Finance Commission. The fund, down to \$137,000, will not be built up until sales tax collections, including those from the heavy Christmas trade, are made.

UTAH FLOOD CONTROL—More work needs to be done in the Salt Lake area to insure better flood protection, according to Col. William J. Ely, Sacramento (California) district engineer. Among the most needed improvements are work on the Surplus Canal and Jordan River. Drainage and flood control projects in the rest of Utah have been inspected and the situation generally looks good, he said.

UTAH must take steps to determine its water and power requirements if the state's resources are ever to be fully developed, said George D. Clyde, director of the Utah Water and Power Board. He was addressing the annual dinner meeting of the Associated General Contractors in Springville, Utah. He also discussed the Colorado River storage program, reporting that the demand for water in the Colorado Basin was more than the available supply.

FIFE CONSTRUCTION CO. of Brigham City was low bidder at \$106,230 for 4 mi. of bituminous surface road in Weber County.

WASHINGTON

STREAMLINED SPAN—The New Harvard Road Bridge across the Spokane River has been streamlined to the utmost by Spokane County design engineers. The bridge, which will be about 400 ft. long and will cost about \$220,000, will be built from 78-ft. long precast, prestressed girders. The structure was expected to be let out for bid in February, according to Clyde Chaffins, county engineer.

SNOHOMISH COUNTY'S Public Utility District No. 1 has adopted a \$7,285,400 budget for 1954. Items included in this sum are a new service headquarters, two 100,000-v. transmission lines, substations, operation and maintenance, and line extensions and replacements.

THE STATE OF WASHINGTON faces a severe power shortage within the next 2 years unless a dam is built at Ice Harbor, according to Harry Hudlow, Franklin County Public Utility District Manager. He based this prediction on the present rate of population and industrial growth in the area, pointing out that the state use of hydroelectric power is growing at the rate of 550,000 kw. hr. yearly.

WELLS DAM—Puget Sound Power & Light Co. has applied for a preliminary permit to carry out engineering and economic studies into the possibility of building a dam at Wells, about 50 mi. north of Wenatchee on the Columbia River. The Corps of Engineers has estimated that the site is capable of an ultimate development of 600,000 kw. The project would cost about \$193,000,000. The company also plans to apply for a preliminary permit to develop the Upper Baker River project in Whatcom County, which would add 40,000 kw. of power generation to the company's facilities, according to Frank McLaughlin, the company's president.

APPLICATION has been made by the Chelan County (Washington) Public Utility District to the Federal Power Commission for permission to conduct preliminary studies for a hydroelectric power dam at Rocky Reach on the Columbia River 10 mi. north of Wenatchee. Estimated power production of the dam would be 600,000 kw. in a run-of-the-river design.

TOLL TUNNEL?—A \$33,000,000 system of freeways leading northward from central Seattle has been proposed by D. L. Evans, King County highway engineer, who said that the facility would have to be financed by tolls and a bond issue. Feature of

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the plan would be a 1½-mi. long toll tunnel under Capitol Hill. The new system would enable motorists from certain residential suburbs to reach the city center in a very few moments.

BATTERY STREET SUBWAY in Seattle will be completed on the project's due date, March 17, barring unforeseen difficulty, according to engineers on the job. The construction story of this \$2,384,061 project is told in *Western Construction*—July 1953, pp. 76-78.

YAKIMA OVERPASS—Plans for the construction of an overpass in Yakima, Wash., are being pushed by the city commission after being held up during legal action in regard to right-of-way acquisition. Construction funds will come from a \$400,000 bond issue, approved by the voters some time ago.

BENNETT-CAMPBELL, INC., Seattle, submitted a low bid of \$1,549,275 for construction of a four-story addition to Bon Marche Department Store in Seattle. No contract award had been made at last report. Low bidder on construction of a state office building in Olympia was Macdonald Building Co. of Tacoma. The bid was for \$1,748,660. Fiorito Bros. of Seattle received a \$452,814 contract for 2.7 mi. of grading and paving on State 1 in Lewis County. Completion date is 180 calendar days after December 1. General Construction Co. of Seattle got a \$686,000 dredging contract from the Port of Tacoma.

STRUCTURAL STEEL PATTERN

This structural steel framework for the new Ford Motor Co. assembly plant at Milpitas, Calif., being erected by Bethlehem Pacific Coast Steel Corp., is scheduled for completion this month. J. H. Pomeroy & Co., Inc., of San Francisco has a \$10,000,000 contract to build the plant. Chet Baldwin is project manager and George Sweeney is resident engineer for Ford.



WYOMING

FINAL LINK in the \$1,500,000 improvement program carried on by the Wyoming Highway Department in the Cheyenne area was completed when the Archer overpass was opened to traffic. This overpass, which cost \$507,000 to build, makes U. S. 30 a three-lane highway from Cheyenne east to the Nebraska state line. A. L. Putnam was project engineer on the job.

PALISADES PROJECT—Work is continuing throughout the winter on spillway excavation and concrete tunnel lining on the \$76,000,000 Palisades reservoir project. Meanwhile Lower Valley Power & Light, Inc., is planning to call for bids on construction of transmission and distribution power lines between Palisades Dam and Jackson during March.

AERIAL PHOTOGRAPHY is being used by Wyoming Highway Department map makers to produce the most accurate county maps of any state in the country, according to Robert True, chief planning division draftsman in charge of the project.

WYOMING HIGHWAY CONSTRUCTION—The Wyoming Highway Department has accepted as complete more than 11.5 mi. of roads and streets in Niobra County. The combined job, done by Knisley-Moore, included base course surfacing, road-mix oil treatment, and miscellaneous

work. Archie Huey, first highway district project engineer, supervised the construction.

RESIDENTS OF CASPER, Wyo., were assured by Fred Aandahl, Assistant Secretary of the Interior, that the Bureau of Reclamation would not close its Casper office even though some of its functions might be moved to a proposed headquarters at Loveland, Colo. A service office and warehouse will be kept operating in Casper, he said.

HIGHWAY CONSTRUCTION in Wyoming is being performed by Platte Valley Construction Co. of Grand Island, Neb., awarded a \$359,215 contract for 10 mi. of grading and surfacing in Platte and Laramie counties, and Boatright-Smith of Rawlins, awarded a \$236,845 contract for 5.8 mi. of grading, surfacing, and seal coating in Hot Springs and Washakie counties.

HERE AND THERE

AIR FORCE CONTRACTS—The Air Force plans to award about \$75,700,000 worth of military construction projects during 1954 through the North Pacific Division of the Corps of Engineers, according to Brig. Gen. D. G. Shingler, Division Engineer. The projects, including ammunition and storage facilities, fire stations, maintenance shops, gunnery ranges, hospitals, taxiways, hangars, utilities, electric generating plants, gasoline storage tanks, road construction, control towers, warehouses and miscellaneous buildings, will be advertised through the Seattle, Walla Walla, and Alaska Districts.

HAWAII CALLS—Work on drilling a vehicular tunnel through the Koolau mountain range on Oahu Island, Territory of Hawaii, is expected to start soon. E. E. Black, Ltd., won the award to drill a two-lane highway tunnel through more than ½-mi. of mountain with a low bid of \$4,518,580. The firm of Gibbons & Reed Co., of Salt Lake City, is supplying personnel to direct the tunnel drilling.

PRIVATE POWER COOPERATION—Six private power companies in the Pacific Northwest are planning for joint development of dam sites in cooperation with the federal government in line with the administration's proposed partnership program. The companies are Montana Power Co., Idaho Power Co., Mountain State Power Co., Washington Water Power Co., Pacific Power & Light Co., and the Portland General Electric Co. The need for more power was outlined by a spokesman for the

group, who pointed out that Washington and Oregon will have a shortage of 2,000,000 kw. in about 6 yr. if new dams are not constructed. Merger plans were revealed by J. E. Corrette, president of the Montana Power Co., at a meeting of the governors of the four Northwest states with public and private power producers in this region.

ABOUT 75 residents of Nevada, Utah, and California got together at Lake Tahoe and formed the Western States Highway Association, which is dedicated to advertising the advantages of using U. S. 50 when traveling from the Pacific Ocean to the Rocky Mountains.

HOW TO PAINT steel structures is described in the first of two volumes of the "Steel Structures Painting Manual" published by the Steel Structures Painting Council. Volume 1, entitled "Good Painting Practice," describes the best of the current surface preparation and painting practices. It includes chapters on corrosion theory, chemical surface preparation, practical use of paints, quality control, shop painting, painting of steel vessels and tanks, painting of industrial plants, petroleum refineries, chemical plants, maintenance painting of steel, and causes and preventions of paint failure. Copies of this 432-page book, which is 8½ x 11 in., may be ordered from the Steel Structures Painting Council, 4400 Fifth Ave., Pittsburgh 13, Pa., at a cost of \$6 each postage paid.

COLORFUL "SOURDOUGH" PROSPECTORS may have mushed their way right out of the picture in Alaska, according to Ted C. Mathews, Fairbanks consulting engineer. The bearded prospectors who hiked into the hills and struck a bonanza or two are making what seems to be a last ditch stand, while Alaskan leaders hope large corporations will step in and make king-size investments to develop the territory's natural resources. In a talk to the Fairbanks chamber of commerce, Mathews pointed to the need for continued exploration and searching out of the territory's vast potential. Referring to the early-day "sourdough" type of prospector, Mathews said about 40,000 of these have combed Alaska quite thoroughly since 1912 and have pretty well exploited surface possibilities.

UNDER THE WAVES—Transportation of construction supplies to Alaska by barge recently was subject to the whims of the North Pacific. A Seattle barge, bound for Seward and weighted down by almost 5,000 tons of cement, recently turned turtle near Ketchikan and sank beneath the waters of Tongass Narrows. Loss was about \$300,000, early reports stated.



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Each extension crew of Hattendorf-Bliss, Inc., Cleveland, Ohio contractors, completes 4 or 5 jobs every day—trench dug, pipe laid, trench filled, job cleaned up. The jobs average 250-300 feet each, for 4, 6 and 8 inch pipe and require 10-15 miles of traveling through big-city traffic.

Hattendorf-Bliss have standardized on *Cleveland*s for over 20 years. Currently the firm is working 9 *Cleveland* trenchers and backfillers for many types of trench work. In one 10-hour day, a Hattendorf-Bliss crew with one *Cleveland* trencher completed 11,000 feet—

over 2 miles—of trench 19" wide and 30" deep for a 4" pipeline, including the crossing of a 20' stream.

"We go with *Cleveland*s," say Hattendorf-Bliss, "because we know from experience they'll do every job we schedule them for. They stand hard usage and they're fast. Their full-crawler mounting and low bearing pressure protect lawns and sidewalks—we practically never have a damage claim. And because they're compact and easy to transport, we can really cover the distance between jobs with safety at good speeds."

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ALASKA Newsletter

By CLIFFORD S. CERNICK, Anchorage

ALASKA'S MID-WINTER CONSTRUCTION LANDSCAPE—The territorial construction picture as seen from the vantage point of mid-winter is a bleak and frozen one. Virtually no outside work is being done now that the mercury has plunged and temperatures hover 10, 20 and 30 deg. below freezing. For the construction trades in Alaska, January and February are traditionally the two "roughest" months in the whole calendar. As in years past, union and employment officials in Alaska's largest city, Anchorage, report construction employment at its lowest ebb. Some pickup in jobs is imminent however, now that planning for the 1954 construction season is well advanced. Many contractors are arranging for advance crews to take care of preliminary work and handle incoming supplies and equipment. Right now, however, construction men in Alaska can honestly say they "never had it so bad."

ELMENDORF CONSTRUCTION HUB—Major construction projects for Elmendorf airbase total approximately \$4,000,000, according to the District Engineer. Projects include a \$2,000,000 warehouse depot, a \$1,000,000 dormitory rehabilitation project and about \$1,000,000 more in miscellaneous shops and utilities.

SQUAWKS ALONG THE YUKON—The controversy over the precious headwaters of the mighty Yukon seems ready to emerge into the open again. In August of 1952, the Aluminum Company of America announced it was prepared to develop a \$400,000,000 power and aluminum project in the Taiya valley near Skagway if Canadians would permit use of Yukon River headwaters for the purpose. Canadian authorities turned thumbs down on the project. However, recent reports indicate that studies are being made by Canadian engineers to show that the Taiya project is the only feasible means of utilizing waters of the upper Yukon to produce power at a cost sufficiently low to attract large industries. If the job is ever authorized, it would involve construction of 21 mi. of tunnels from Canada to the Alaskan coast and would generate 800,000 kw. of power.

CATS BATTLE SUB-ZERO COLD—King Winter's icy grip, which generally manages to put most Alaska construction operations into a prolonged deep-freeze, isn't handicapping about 25 tough-bearded catskinners already assigned to work on the huge Haines-Fairbanks pipeline proj-

ect. In temperatures that sometimes plunge to 30 and 40 below, these hardy construction men are braving the Arctic blasts to hack out a right-of-way for the 621-mile line. Ponderous bulldozers are ripping away at the frozen tundra and snow-covered

OPEN ROAD—The section of Richardson Highway from Big Timber to Big Delta Junction, a distance of 138 mi., is being kept open during the winter months on an experimental basis through the cooperation of interested trucking firms and the Territory of Alaska. To date, winter conditions in the area have been comparatively mild, and it now appears that ear-marked funds will stretch into February, according to William J. Niemi, chief engineer of the Alaska Road Commission. Therefore, prospects appear favorable for continuation of winter maintenance of this section of the road.

brush at a pace that should clear the major part of the right-of-way by the time spring comes to the northland. Frostbite, wolves, isolation, and mechanical difficulties are some of the initial headaches being experienced by crews, which are the vanguard of an army of construction stiffies scheduled to move north this summer to push through the back-breaking job. Major John E. England, resident engineer in charge of the \$29,001,281 contract, has set up construction camps at both Fairbanks and Tok Junction.

HOME-BUILT BRICK — Good news for Alaskan construction men is announcement that a brick manufacturing plant will be added to growing list of Anchorage industries by next July. Chamber of Commerce reports the new brick plant will have a 10,000 daily capacity, and output will include both regular building bricks and also firebrick.

POWER-HUNGRY INDIANS—Alaska's Metlakatla Indians aren't going on the warpath but they want power, the kind that surges over transmission lines and operates toasters. These Indians, whose ancestors worshipped totems, recently called on Uncle Sam to grant them a \$1,303,000 loan to construct the Purple Lake power site to serve both the village of Metlakatla and the Annette Island

airfield. The loan was granted; now bids are being advertised for the first phase of the work. This covers construction of a half-mile long tunnel through a ridge in order to tap Purple Lake at a depth of 34 ft. The lake lies at an elevation of 316 ft., is about 1,000 ac. in extent and will reservoir 20,000 acre feet of water for draw-down purposes, according to engineers.

DON'T FENCE US IN—British Columbia and Yukon business men declare they feel "fenced in" from the sea by the narrow strip of U. S. territory known as the Alaskan "Panhandle." Canadians have served notice they would like to work with Alaskan representatives in arranging a Pacific Ocean outlet for their communities and shipments. Several corridors from Canada to the sea through the "Panhandle" have been suggested. In the event an agreement could be worked out, new roads from Canadian centers to the seacoast would be required, and new seaport communities could be born. Canadians emphasize that they wish in no way to interfere with the rights of the people of Alaska or with existing towns or ports.

VANISHING VILLAGES—Municipal engineers and construction men in Alaska have taken an interest in Canada's "vanishing villages" because Alaskan towns may face similar extinction. Canadian authorities reported recently that the towns of Ak-lavik and Coppermine must be moved to new sites in the Canadian north. Ak-lavik must be moved because it is slowly sinking through a layer of permafrost on which it was built. The frozen layer is melting and buildings are beginning to sink. Coppermine is being moved to a site where better water supply and sewage facilities are available. About 150 buildings in Ak-lavik will be moved to the new site. Most of the inhabitants of the villages are Eskimos and Indians. A number of Alaska villages are similarly situated on permafrost sub-terrain.

TO BE OR NOT TO BE TIME—January and February are "crucial" months in Alaska with regard to setting of terms and conditions for the 1954 construction contracts. Contract negotiations for more than 15,000 construction workers moved into high gear the latter part of January and early February. This year, employers are asking the crafts to take a 25-cent hourly wage slash. Unions, on the other hand, are asking a dollar an hour more. This gulf between offer and demand will be subject to prolonged negotiation. Unions involved in early negotiations are engineers, teamsters, laborers, bricklayers, plasterers, cement finishers and ironworkers. Carpenters, plumbers and like trades generally are among the latest to reach agreements with the contractors.

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The quotation at the top of this page is typical of impartial observers who have seen the new Barber-Greene MIXALL perform. There is widespread agreement among editors, road builders and government officials that the need for a machine capable of on-the-spot production of even the highest type hot mixes has been answered by the development of the MIXALL. Primarily designed for "stitch in time"

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UNIT PRICES

Selected abstracts for Western projects

SEWERAGE—Trunk sewer construction for Las Vegas, Nevada

Nevada—Las Vegas—City. Ralph O. Dixon, San Carlos, Calif., was low bidder before the City of Las Vegas for Schedules B and C on installation of vitrified clay pipe trunk sewers. Dixon's bid was \$301,767 for Schedule B and \$216,977 for Schedule C. Unit prices were as follows:

	Schedule B	Schedule C
(1) Ralph O. Dixon	\$301,767	\$216,977
(2) Cannon Construction Co.	329,686	225,980
McCammon-Wunderlich Co.	358,119	234,962
Morrison-Knudsen Co., Inc.	357,129	244,819
Wells Cargo, Inc.	384,073	232,343
Vanvaal-Kenburn	380,381	259,277
Charles J. Dorfman	421,138	261,630
Taylor & Sloan	436,999	279,144
J. H. Welsh & Son	489,560	290,499
Engineer's estimate	381,455	277,170

SCHEDULE B	(1)	(2)
1,228 lin. ft. 24-in. std. str. V.C.P.	13.00	11.00
274 lin. ft. 24-in. ex. str. V.C.P.	13.30	12.23
6,251 lin. ft. 18-in. std. str. V.C.P.	7.38	7.98
563 lin. ft. 18-in. ex. str. V.C.P.	9.80	8.60
4,431 lin. ft. 15-in. std. str. V.C.P.	5.16	6.13
248 lin. ft. 15-in. ex. str. V.C.P.	6.50	7.19
20,416 lin. ft. 12-in. std. str. V.C.P.	3.89	4.27
400 lin. ft. 12-in. ex. str. V.C.P.	5.00	4.57
11,744 lin. ft. 10-in. std. str. V.C.P.	3.05	3.86
345 lin. ft. 10-in. ex. str. V.C.P.	3.80	4.06
8,421 lin. ft. 8-in. std. str. V.C.P.	2.33	2.88
100 lin. ft. 4-in. std. str. V.C.P.	2.90	2.00
162 ea. std. manholes	275.00	248.00
2 ea. std. drop manholes	325.00	275.00
2 ea. std. siphon manholes	310.00	275.00
50 cu. yd. conc. cradle	39.00	20.00
3,700 cu. yd. gravel base	3.00	5.00
1 R.R. crossing	\$6,175	\$7,000
1 siphon	\$2,215	975.00
1 alteration to manhole	75.00	100.00
1 alternation to manhole	220.00	100.00

SCHEDULE C	(1)	(2)
834 lin. ft. 24-in. std. str. V.C.P.	11.50	10.29
2,275 lin. ft. 24-in. re. conc. pipe	11.28	10.38
3,250 lin. ft. 21-in. std. str. V.C.P.	9.40	8.72
2,005 lin. ft. 18-in. std. str. V.C.P.	7.40	8.08
3,594 lin. ft. std. str. V.C.P.	5.64	6.02
3,942 lin. ft. 12-in. std. str. V.C.P.	4.60	4.37
11,318 lin. ft. 10-in. std. str. V.C.P.	3.22	3.96
250 lin. ft. 10-in. ext. str. V.C.P.	4.22	4.16
6,969 lin. ft. 8-in. std. str. V.C.P.	2.70	2.98
684 lin. ft. 8-in. ex. str. V.C.P.	3.25	3.14
520 lin. ft. 4-in. std. str. V.C.P.	2.40	2.00
1 ea. 24-in. conc. pipe and cradle	400.00	462.00
200 lin. ft. 8-in. sewer drain	6.00	5.00
96 ea. std. manholes	275.00	248.00
1 ea. drop manholes	325.00	275.00
3 ea. std. pressure manholes	370.00	200.00
40 cu. yd. conc. cradle	39.00	20.00
2,800 cu. yd. gravel base	3.00	4.50
1 ea. R.R. crossing	\$2,870	\$2,767
1 ea. special manhole	990.00	570.00
1 ea. special manhole	800.00	680.00
1 ea. special manhole	1,040	900.00
1 ea. by-pass manhole	600.00	475.00

MISCELLANEOUS—Riprap, concrete embankment and channel protection

California—Contra Costa County—State. O. C. Jones & Sons, Berkeley, was low bidder with \$14,522 submitted before the Division of Highways for about 0.6 mi. of riprap, concrete embankment and channel protection north of Glen Frazer. Unit prices were as follows:

(1) O. C. Jones & Sons	\$14,522
(2) Robert R. Murdoch	14,940
Charles S. Moore	15,290
Eugene G. Alves	15,383
Bos Construction Co.	15,607
James W. Hill	16,276
R. G. Clifford and C. O. Bodenhamer	16,932
Morison Construction Co.	17,021
Al Erickson & Co.	17,369
Gallagher & Burk, Inc.	17,977
J. Henry Harris	18,013

	(1)	(2)
5 cu. yd. removing concrete	25.00	20.00
292 cu. yd. structure excavation	8.00	8.00
100 lin. ft. surface ditch	1.00	1.50
76 ton imported base material	6.00	8.00
102 cu. yd. Class "A" P.C.C. (structures)	50.00	50.00
200 sq. yd. mesh reinforcement	7.00	7.00
170 sq. ft. grouting existing riprap	2.00	2.75
145 cu. yd. sacked P.C.C. riprap	35.00	38.00
17 cu. yd. replacing broken concrete riprap	50.00	38.00

HIGHWAY—13 mi. grading and gravel surfacing in Montana

Montana—Powder River and Carter counties—State. Northwestern Engineering Co., Rapid City, So. Dak., won an award from the State Highway Commission on the basis of a low bid of \$523,790 for 12.9 mi. of grading, gravel surfacing, road-mix oiling and draining on the Broadus to Wyoming state line highway. Unit prices were as follows:

(1) Northwestern Engineering Co.	\$523,790
(2) Peter Kiewit Sons' Co.	527,684
Lou Richardson	549,916
S. Birch & Sons Construction Co.	555,260
Holzworth Construction Co.	565,080
Inland Construction Co.	567,732
Taggart Construction Co.	591,880

	(1)	(2)
596,862 cu. yd. uncl. excav. and borrow	.196	.19
42,463 cu. yd. sand-base course	.70	.98
4,543 cu. yd. culvert excavation	1.00	1.25
22,490 mi. yd. overhaul	.20	.19
3,325 ton crushed gravel cov. matl.	4.75	5.00
42,747 ton Type A top coat surf.	1.76	1.71
69,429 ton gravel base course	1.55	1.61
224,753 gal. appl. MC-3 ARO for mix	.15	.14
44,341 gal. appl. MC-1 ARO for prime	.17	.17
77,599 gal. appl. MC-5 ARO for seal	.17	.15
12,906 mi. processing	\$1,000	900.00
274 sq. yd. processing	.50	.45
600 units rolling embankment	6.00	6.00
870 units rolling surface course	8.00	7.00
10,820 M. gal watering	2.00	1.85
44 lin. ft. corr. metal pipe culvert, 15-in. diam.	3.80	3.50
106 lin. ft. corr. metal pipe culvert, 18-in. diam.	3.80	3.75
2,260 lin. ft. corr. metal pipe culvert, 24-in. diam.	6.20	6.00
212 lin. ft. corr. metal pipe culvert, 30-in. diam.	7.40	7.00
58 lin. ft. corr. metal pipe culvert, 36-in. diam.	15.00	13.75
142 lin. ft. corr. metal pipe culvert, 48-in. diam.	16.40	15.25
140 lin. ft. corr. metal pipe culvert, 60-in. diam.	29.40	27.00
208 lin. ft. corr. metal pipe culvert, 72-in. diam.	35.00	32.00
130 lin. ft. str. pl. pipe culv., 78-in. diam., 10-ga. met.	41.40	40.00
122 lin. ft. str. pl. pipe culv., 84-in. diam., 10-ga. met.	45.30	44.00
104 lin. ft. str. pl. pipe culv., 102-in. diam., 10-ga. metal	55.80	54.00
158 lin. ft. str. pl. pipe culv., 120-in. diam., 8-ga. met.	72.30	69.00
74 lin. ft. str. pl. pipe culv., 150-in. diam., 10-ga. metal	81.40	78.00
32 lin. ft. relay pipe culverts	2.00	1.50
456 cu. yd. gravel backfill	3.00	4.50
1 ea. conc. project marker	25.00	25.00
68 ea. conc. station markers	10.00	7.00
134 each conc. r/w monuments	5.00	5.00
Lump sum, rem. ex. str. and mntn. traffic Sta. 1005+06	\$1,100	\$2,000
Lump sum, rem. ex. str. and mntn. traffic Sta. 1206+09.5 and 1344+42	900.00	\$2,000

DAM—Powerhouse excavation, substructure construction and other work at The Dalles Dam site

Oregon and Washington—The Dalles Dam site—C. of E. Guy F. Atkinson Co. and Ostrander Construction Co., Portland, was low with \$18,886,006 submitted before the Corps of Engineers for completion of the excavation for and construction of the substructure for main unit bays 15 to 22, inclusive, of the powerhouse, and excavation for and construction of the east fish ladder and east concrete non-overflow dam, and furnishing and installing weirs and gates in the powerhouse fish collection system, at The Dalles Dam site. Unit prices were as follows:

(1) Guy F. Atkinson Co. and Ostrander Construction Co.	\$18,886,006
(2) Donovan Construction Co., Winston Bros. Co., C. F. Lytle Co., S. Birch & Sons Construction Co., F & S Contracting Co., Foy & Bros., Inc., Johnson, Drake & Piper, Inc., Regles Construction Co., Ltd.	19,654,067
Consolidated Builders	20,794,328
Jones-Grove-Manson	22,379,812
Morrison-Kiewit-Macco	23,468,888
Engineer's estimate	20,056,581

	(1)	(2)
5,900 cu. yd. excavation for cofferdam unclassified.	6.00	12.00
3,400 ton government-furn. sheet piling, in place	85.00	90.00
500 cu. yd. sand and cement in burlap bags, in pl.	110.00	87.00
88,000 cu. yd. fill in cofferdam cells, in place	.97	.70
7,200 cu. yd. dumped-stone revetment, in place	2.00	.80
Lump sum, removal of fill material	\$20,000	\$10,500
790 mile removal and reconditioning of steel piling	30.00	14.00
80 cu. yd. conc. in cofferdam placed above water	32.00	24.00
325 cu. yd. conc. in cofferdam placed under water	95.00	98.00
6,000 cu. yd. conc. in cell foundation, placed under water	9.00	8.65
Lump sum, furn., installing and operating initial pumping facilities of 10,000 gpm. capacity	\$450,000	\$198,000
3 5,000 gpm. furn., installing, and operating additional pumping facilities	\$4,200	\$16,000
260,700 cu. yd. excav., unclassified, in powerhouse and east non-overflow dam	2.70	2.81
46,500 cu. yd. excav., unclassified, in east fishladder	3.00	4.66
18,000 cu. yd. fill	.76	.93
13,500 cu. yd. fill under fishway	1.25	1.24
34,000 sq. yd. final foundation clean-up	.45	2.64
16,560 lin. ft. drilling drain holes	2.00	1.25
477,560 bbl. cement, portland	3.90	4.60
250,600 cu. yd. concrete, powerhouse	21.45	23.00
26,950 cu. yd. concrete, east fishladder	42.00	66.26
77,520 cu. yd. concrete, east non-overflow dam	8.70	10.90
175 lin. ft. 4-in. concrete tile drain	1.20	1.80
752 lin. ft. 8-in. concrete pipe drain	2.70	2.00
5,600 lin. ft. 8-in. half round CMP drain, in place	2.50	2.50

Continued on page 90

GREATER WORK CAPACITY

With **LOWER EQUIPMENT INVESTMENT**

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MODELS AVAILABLE

- SPC— Shown at right
- TM— For Mounting on any 1 1/2 Ton Truck or Larger
- CTM— For Rear-End Mounting on Crawler Tractors
- SPT— Self-Powered Tractor Type
- PTO— Power Take-Off Powered Tractor Type

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Here's the low-cost, easily operated unit you have been waiting for! The new and improved Model SPC combines all the features of the other work-hungry HOPTO models plus the light bearing pressure of 3 pounds per square inch necessary for work on swampy soils. Bearing pressure of 17" track pads is so light that unit may be moved across landscaped areas without disturbing turf.

Complete unit is Badger built. The 20% overload safety factor and the built in by-pass and relief valves protect the completely hydraulic Model SPC. Four easily-actuated levers conveniently banked for the operator control every movement of HOPTO from 190° swing to 16'4" reach . . . from

11'4" digging depth to hydraulic control of bucket that permits 'straight-down' excavation for foundations, septic tanks, etc.

In average to heavy soils, the Model SPC has an hourly trenching capacity of 60' of 2' trench 6' deep. Fast cycling and ease of operation gives HOPTO a loading capacity of 40 cubic yards per hour with a quarter-yard bucket. Larger buckets are available for handling bulky materials. With backhoe, HOPTO has a loading clearance of 8'6"; 10' clearance with shovel bucket.

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A crane boom to replace dipper stick converts HOPTO into a mobile crane for spotting timbers, trusses, steel . . . for placing heavy equipment, spotting culvert sections, unloading bulky equipment. Crane boom may also be equipped with hydraulically controlled grapple with a loading clearance of 18'. Same attachments are available for TM Model shown at left.

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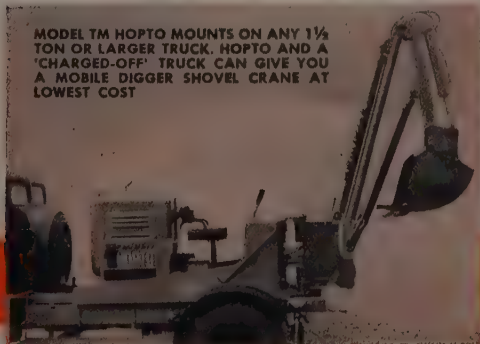
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UNIT PRICES

	(1)	(2)
140 lin. ft. porous concrete drain, in place	15.00	14.00
5,500 lin. ft. 6-in. rubber water stop	1.85	2.05
17,600 lin. ft. 9-in. rubber water stop	2.15	2.27
1,700 lin. ft. 12-in. rubber water stop	3.50	4.15
110 cu. yd. drilling and grouting anchor bars	1.00	1.20
110 cu. yd. temporary concrete bulkheads	60.00	79.00
1,600 cu. yd. talc-paving	15.00	9.00
25 ea. diffusion chamber gates, 4 ft. x 4 ft.	\$4,500	\$4,081
14 ea. diffusion chamber gates, 5 ft. x 4 ft.	\$4,200	\$4,116
15 ea. diffusion chamber gates, 5 ft. x 5 ft.	\$5,000	\$4,476
63 ea. mechanical equip. for weirs and gates for 8-ft. - 8-in. width openings	\$4,000	\$3,392
6 ea. mechanical equipment for 17.5-ft. weirs	\$6,000	\$5,793
6 ea. mechanical equip. for 30-ft. weirs	\$6,500	\$6,233
Lump sum, mechanical equip. for counting station	\$15,000	\$11,300
986,310 lb. structural steel weirs, gates, bulkheads and stoplogs	.32	.30
38,809,750 lb. reinf. steel, except struct'l grade dowels, in place	.106	.0944
488,000 lb. structural grade steel dowels, in place	.11	.12
104,420 lb. structural steel, in place	.27	.25
205,300 lb. cast iron pipe and fittings, in place	.29	.35
118,590 lb. steel pipe and fittings, 12-in. and under, in place	.44	.50
282,910 lb. steel pipe and fittings over 12-in., in place	.24	.40
1,120 lb. valves 6-in. and under, in place	1.10	1.00
2,830 lb. valves 8-in. and over, in place	.70	.70
30,330 lb. iron castings	.35	.50
380 lb. miscel. non-ferrous metal and appurt. fittings	3.00	2.40
337,870 lb. rail (all)	.17	.20
120,930 lb. hand railing	.55	.60
364,550 lb. miscel. steel and metal work	.40	.42
516,330 lb. corrosion-resisting clad steel plate	.60	.50
130,510 lb. corrosion-resisting steel	.91	.70
3,110,800 lb. structural steel for all guides and storage latches	.33	.31
195,760 lb. diffusion chamber grilles	.24	.30
135,300 lb. steel gratings, roadways	.28	.33
Lump sum, miscel. architectural features	\$50,000	\$25,000
410 lin. ft. conc. drainage and sewer pipe 6-in. and 8-in.	2.00	6.00
3,610 sq. yd. asphaltic concrete paving	3.00	3.60
152,200 lb. steel conduit, fittings and outlet boxes	.85	.66
7,340 lb. electrical cabinets and boxes, galv. sheet metal	2.00	1.10
5,410 lb. galvanized cast iron boxes	2.50	1.70
21,180 lb. non-metallic conduit and fittings	.65	.35
Lump sum, miscel. auxiliary and power control equip.	\$5,000	\$6,400
9,400 lb. bare copper ground conductor and fittings	2.00	1.42
4,210 lin. ft. cable trays and supports	6.50	5.60
Lump sum, lighting system fixtures, switches, receptacles, panelboards and wire	\$110,000	\$52,800
65 ea. lighting standards	350.00	354.00
Lump sum, indoor load center unit substations	\$75,000	\$62,700
Lump sum, 480-volt control centers	\$60,000	\$60,000
Lump sum, dry-type lighting transformers	\$7,500	\$2,970
Lump sum, electric heaters	\$2,500	\$1,490
21,350 lb. power control and communication wire and cable	2.50	2.20
42 lin. ft. furnish and install staff gage	10.00	20.00
540 tr. ft. railroad constr. on fill	10.00	10.00

AIRPORT—Runway and taxiway extensions at Yuma County Airport

Arizona—Yuma County—C. of E. Fisher Contracting Co., Phoenix, won an award from the Corps of Engineers on the basis of a total low bid of \$387,339 for construction of Schedule A, runway extension, and Schedule C, taxiway extension, at the Yuma County Airport. Unit prices were as follows:

	Schedule A	Schedule C
(1) Fisher Contracting Co.	\$200,030	\$187,309
(2) E. C. Young and I. L. Croft & Son, Inc.	226,828	202,926
Robert E. L. Parker Co.	227,811	199,585
Marshall & Haas	232,747	219,325
M. M. Sundt Construction Co.	265,704	214,219
Government estimate	244,509	199,018

SCHEDULE A

	(1)	(2)
55 acre clearing	50.00	125.00
76,000 cu. yd. excavation	.51	.76
1 job runway marking and stripping	\$3,000	\$2,096
4 ea. handholes	560.00	400.00
710 lin. ft. four 4-in. duct bank concrete, encased	7.80	4.50
810 lin. ft. storm drain, 24-in. R.C.P. or 30-in. C.M.P.	10.00	13.50
220 lin. ft. storm drain, 33-in. R.C.P. or 36-in. C.M.P.	18.00	15.50
1 ea. headwall, Type A	690.00	500.00
1 ea. manhole, reinforced concrete	1,000	800.00
1 ea. inlet, reinforced concrete	770.00	850.00
6,910 cu. yd. pavement, flexible, selected materials, base course	3.15	3.20
8,800 cu. yd. pavement, flexible, stabilized aggregate, base course	3.30	3.20
113 ton pavement, flexible bituminous prime coat	38.00	40.00
27.5 ton pavement, flexible, bituminous tack coat	36.00	40.00
5,970 ton pavement, flexible, bituminous binder course except asphalt	4.40	4.60
5,300 ton pavement, flexible, bituminous surface course except asphalt	4.50	4.60
720 ton pavement, asphalt cement, Grade AP-3 (85-100 penetration)	30.00	27.00
37 acre mulching	80.00	200.00
2,180 lin. ft. remove and reinstall fence	.55	1.00
1,500 lin. ft. new fencing	.70	1.25

SCHEDULE C

	(1)	(2)
40 acre clearing	50.00	125.00
88,000 cu. yd. excavation	.51	.76
1 job taxiway marking and stripping	850.00	800.00
1 job threshold lights	1,600	\$2,600
1 ea. handholes	560.00	400.00
340 lin. ft. four 4-in. duct bank, concrete encased	7.80	4.50
484 lin. ft. storm drain, 63-in. R.C.P. or 72-in. C.M.P.	46.30	38.50
1,556 cu. yd. concrete pavement	27.50	22.00
2,330 bbl. portland cement	5.70	5.00
2,320 cu. yd. pavement, flexible selected materials, base course	3.15	3.20
4,580 cu. yd. pavement, flexible, stabilized aggregate base course	3.30	3.20
45 ton pavement, flexible, bituminous prime coat	38.00	42.00
9 ton pavement, flexible, bituminous tack coat	36.00	42.00
1,794 ton pavement, flexible, bituminous binder course, except asphalt	4.40	4.60
2,177 ton pavement, flexible, bituminous surface course, except asphalt	4.70	4.60
254 ton pavement, asphalt cement, Grade AP-3 (85-100 penetration)	30.00	27.00
2 ea. headwall, Type B	760.00	800.00
34 acre mulching	80.00	200.00
1,790 lin. ft. remove and reinstall fence	.55	1.00
1,230 lin. ft. new fencing	.70	1.25

HIGHWAY—2 mi. of grading, draining, base course surfacing and surface treatment

Wyoming—Goshen County—State. Read Construction Co., Cheyenne, was awarded a contract by the State Highway Department on the basis of a low bid of \$72,477 for grading, draining, base course surfacing, surface treatment and miscellaneous work on 2 mi. of the Lingle-Torrington road. Unit prices were as follows:

(1) Read Construction Co.	\$72,477
(2) L. H. Weber	78,804
Lichty Construction Co.	81,809
Wyoming Improvement Co.	85,147
Ready Construction Co.	87,256
Kniesly-Moore Co.	88,410
J. H. & N. M. Monaghan	96,278
Big Horn Construction Co.	97,539
Boatright Smith	106,179
Teton Construction Co.	106,281
Engineer's estimate	88,323

	(1)	(2)
107,000 cu. yd. excavation	.225	.24
137,300 cu. yd. sta. overhaul	.01	.01
9,600 cu. yd. mi. haul	.11	.20
290 hr. sheepfoot roller operation	10.50	10.00
2,020 M. gal. watering (emb.)	2.00	2.00
11,300 ton selected matl. surfacing, Type I	.26	.32
9,100 ton cr. gravel base course (1-in. max.)	.50	.75
1,100 ton cr. gravel surfacing (surf. tr.)	1.71	2.95
81,200 ton mi. haul of surfacing matl.	.09	.08
2,100 cu. yd. binder	.33	.60
10,800 cu. yd. mi. haul of binder	.14	.14
35 hr. equipment roller operation	11.25	12.00
140 hr. roller operation	5.50	6.00
215 M. gal. watering (base)	2.00	2.00
85 ton asphaltic matl. MC-Prime	33.00	32.00
85 ton asphaltic matl. MC (surf. tmt.)	33.00	34.00
50 lin. ft. 12-in. C.M.P.	3.80	3.00
264 lin. ft. 18-in. C.M.P.	3.80	4.00
20 lin. ft. 24-in. C.M.P.	6.25	6.50
60 lin. ft. 18-in. bitum. coated C.M. siphon pipe	6.00	7.30
120 lin. ft. 48-in. bitum. coated C.M. siphon pipe	22.00	20.00
390 cu. yd. excav. for pipe culverts	2.50	1.00
60 hr. mechanical tamping	6.50	5.00
40.1 cu. yd. Class C concrete	60.00	65.00
1,740 lb. reinforcing steel	.145	.15
5,000 lin. ft. standard r/w fence	.185	.25
15 ea. end panels	14.00	16.00
10 ea. brace panels	10.00	14.00
936 lin. ft. metal panel guard fence, Type B	3.50	3.50

HIGHWAY—Grading and P.C.C. paving on freeway and plant-mixed surfacing on ramps

California—San Luis Obispo County—State. Fredrickson & Watson Construction Co., Oakland, submitted a low bid of \$547,453 before the Division of Highways for about 2.4 mi. of grading portions of ramps and freeway in the City of San Luis Obispo, paving the freeway with P.C.C. on cement-treated subgrade, and surfacing the ramps with plant-mixed surfacing on imported base material and cement-treated base. Unit prices were as follows:

(1) Fredrickson & Watson Construction Co.	\$547,453
(2) Clyde W. Wood & Sons, Inc.	550,512
Cox Bros. Construction Co.	588,897
Webb & White	644,619

	(1)	(2)
Lump sum, removing existing curb and rail	100.00	\$1,000
80,000 cu. yd. roadway excavation	.42	.49
700 cu. yd. structure excav.	2.80	3.00
180 cu. yd. ditch and channel excav.	1.90	1.00
500,000 sta. yd. overhaul	.0045	.004
14,000 ton imported subbase material	.90	1.25
900 ton pervious subbase material	3.40	4.00
9,000 ton L.B.M.	.90	1.25
Lump sum, dev. wat. sup. and furn. wat. equip.	\$10,554	\$2,000
3,500 M. gal. applying water	1.50	1.00
125 sta. paving roadway	30.00	30.00
3,350 bbl. portland cement (cem. tr. subgr. and base)	4.75	5.00

Continued on page 92

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LOAD KING — the new truck for '54 — incorporates many outstanding features developed and proved by Cook Bros. during their many years experience in the manufacture of trucks and truck equipment for the heavy construction industry. The LOAD KING is manufactured complete, under one roof, including dump body and hoist, concrete truck mixer, trailer or equipment of your choice . . . one source, one responsibility. With optional equipment listed below, your LOAD KING Truck is "Job Engineered" for YOUR particular requirements in the construction industry.

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Manufacturers of Heavy Duty Trucks and Truck Equipment

UNIT PRICES

	(1)	(2)
66,000 sq. yd. mix., spread. and compact. cem. tr. subgr.	.23	.20
13,000 sq. yd. mix., spread. and compact. C.T.B.	.28	.25
54 ton liq. asph., MC-2 (cur. sl.)	50.00	35.00
20 ton asph. emul. (pt. bdr. and Cl. "D" sl. ct.)	57.00	50.00
3 ton asph. emul. high viscosity type (Cl. "C-Fine" sl. ct.)	80.00	60.00
33 ton screen (sl. ct.)	13.00	8.00
105 ton liq. asph., SC-2 (pr. ct.)	32.00	30.00
7,700 ton miq. aggr. (Type "B" P.M.S.)	6.00	6.00
1,450 ton min. aggr. (open gr. P.M.S.)	7.00	7.00
485 ton paving asph. (P.M.S.)	7.00	6.00
6,400 lin. ft. placing P.M.S. (dikes)	.14	.25
1,900 sq. yd. placing P.M.S. (gutters, ditches and slope dr.)	.56	1.00
400 lin. ft. raised traffic bars	2.15	2.00
14,500 cu. yd. Cl. "B" P.C.C. (pave.)	17.00	16.75
10,000 ea. pave. tie bolt assemb.	.65	.60
47 cu. yd. Cl. "A" P.C.C. (struct.)	84.00	100.00
32,000 lb. misc. iron and steel	.26	.30
18 lin. ft. steel railing	13.50	20.00
2,150 cu. yd. Cl. "B" P.C.C. (curbs, gutters and sidewalks)	32.00	32.00
3 ea. right-of-way monuments	7.30	10.00
11 ea. center line monuments	14.00	15.00
2 ea. survey monuments	27.00	10.00
1,200 lin. ft. met. plate gd. rail	3.40	3.50
321 ea. culv. mkr., cl. mkr., mon. mkr., hor. refl. units and guide posts	6.60	7.00
1,150 lin. ft. 48-in. chain link fence (rail top)	1.42	1.70
4,000 lin. ft. 36-in. chain link fence (wire top)	.94	1.00
42 lin. ft. 12-in. R.C.P.	2.54	4.00
210 lin. ft. 18-in. R.C.P.	4.17	6.00
156 lin. ft. 24-in. R.C.P.	6.23	8.00
230 lin. ft. 36-in. R.C.P.	11.00	14.00
95 lin. ft. 12-in. C.M.P. (16 ga.)	2.55	3.00
150 lin. ft. 18-in. C.M.P. (16 ga.)	3.50	5.00
1,000 lin. ft. 8-in. perf. metal pipe underdr. (16 ga.)	1.70	2.00
140 cu. yd. filter matl.	8.00	6.00
10 ea. spillway assemb.	33.00	30.00
270 lin. ft. 8-in. C.M.P. dn. drain (16 ga.)	2.80	2.00
10 ea. spillway assemb. dn. dr. slip joints	20.00	18.00
10 ea. dn. dr. pipe anchors	24.00	18.00
15,200 lb. bar reinf. steel	.12	.15
140 lin. ft. 1½-in. galv. steel pipe	1.64	1.00
430 lin. ft. 2-in. galv. steel pipe	1.75	1.50
1,100 lin. ft. 2½-in. galv. steel pipe	2.00	2.00

	(1)	(2)
1,600 ea. cross ties, untreated	3.00	3.00
8,442 M.B.M. switch ties, untreated	100.00	90.00
20 ea. sight post, in place	12.00	12.00
3,000 lin. rods right-of-way fence, barbed wire, in pl.	7.00	5.80
1,200 lin. ft. metal guard rail, in place	4.00	3.40
1 job reconstruct bridge	\$12,500	\$8,250
1,300 cu. yd. gravel backfill, in place	3.00	4.00

BRIDGE—A 7-span concrete slab structure

Arizona—Yavapai County—State. Larsen Contracting Co., Phoenix, submitted a low bid of \$58,759 before the State Highway Department for construction of a 7-span concrete slab bridge on steel H-column piles at the State Route 93 crossing of Date Creek, about 31 mi. northwest of Wickenburg. Unit prices were as follows:

(1) Larsen Contracting Co.	\$58,759
(2) Wallace & Wallace	58,996
W. J. Henson, Contractor	63,567
Vinnell Co., Inc.	66,724
Dale F. Payne, Contractor	68,731
Ashton Building Co.	69,918
Western Constructors, Inc.	70,769
Mardian Construction Co.	73,110
Royden Construction Co.	73,431
Phoenix-Tempe Stone Co.	73,819
T. K. G. Construction Co., Inc.	75,770
Fisher Contracting Co.	76,224
Hagen Construction Co.	88,321

	(1)	(2)
8,900 cu. yd. roadway excav.	.50	.40
100 cu. yd. structural excavation	1.00	1.50
10,000 cu. yd. borrow (CIP)	.30	.30
750 M. gal. watering (CIP)	1.00	2.00
200 hr. rolling	8.00	7.00
1,850 cu. yd. select material (CIP)	.60	.40
7,340 lb. structural steel (CIP)	.40	.40
106 cu. yd. Class A concrete (including cement)	54.00	55.00
257 cu. yd. Class D concrete (including cement)	58.00	64.00
74,400 lb. reinforcing steel (bars) (CIP)	.12	.13
80 lin. ft. steel H-column test piles (10-in. x 42-in.) (furnish and deliver)	6.00	3.50
1,330 lin. ft. steel H-column piles (10-in. x 42-in.) (furnish and deliver)	4.50	3.50
2 ea. driving test piles (steel H-column) (10-in. x 42-in.)	150.00	100.00
38 ea. driving steel H-column piles (10-in. x 42-in.)	100.00	70.00
6 ea. spiling piles (steel H-column) (10-in. x 42-in.)	40.00	15.00
150 cu. yd. rock jetty (CIP)	3.00	7.00
200 lin. ft. road guard (std. C-7) (CIP)	3.50	3.50
275 lin. ft. rail bank protection (std. RB-1) (CIP)	12.00	15.00

MISCELLANEOUS—Railroad roadbed preparation and highway grading and draining at The Dalles Dam site

Oregon—Wasco County—C. of E. Fred H. Slate Co. and E. C. Hall Co., Portland, were awarded a contract by the Corps of Engineers on the basis of a low bid of \$2,591,261 for grading and draining 8.7 mi. of double-track Union Pacific Railroad and 7.1 mi. of U. S. 30 at The Dalles Dam site. Unit prices were as follows:

(1) Fred H. Slate Co. and E. C. Hall Co.	\$2,591,261
(2) Gibbons & Reed Co.	2,785,896
Morrison-Knudsen Co., Inc.	2,827,528
Guy F. Atkinson Co.	2,925,492
Parker-Schram Co.	2,987,315
Peter Kiewit Sons' Co.	3,080,860
J. N. Conley and Vernie Jarl	3,160,328
Clyde W. Wood & Sons, Inc., and Wixson & Crowe, Inc.	3,368,014
Kuckenberg Construction Co., Inc.	3,298,087
Max J. Kuey Co.	3,400,188
Johnson Western Constructors and L. E. Dixon Co.	4,016,364
Lowdermilk Bros.	4,397,486
McNutt Bros. and Osberg Construction Co.	4,071,625
Johnson, Drake & Piper, Inc., and Pegles Construction Co., Ltd.	4,734,584
Engineer's estimate	2,758,482

	(1)	(2)
Lump sum, clearing and grubbing	\$65,000	\$40,000
1,451,060 cu. yd. excavation, common	.44	.43
1,272,000 cu. yd. excavation, rock	.88	1.17
47,000 cu. yd. granular topping, in place	1.20	1.00
10,850 cu. yd. filter blanket, in place	2.60	2.50
19,200 cu. yd. rock revetment	2.50	2.40
80,000 sq. yd. wind erosion protection stone, in place	.25	.40
17,000 lin. ft. rounding of tops of cutbanks	.20	.12
1,455,000 cu. yd. m. overhaul	.20	.15
500 hr. rolling, additional roller hours	10.00	16.00
26,700 M. gal. sprinkling	2.00	1.25
3,200 cu. yd. structural excav., unclassified	6.00	2.60
380 lin. ft. 12-in. dia. C.M.P. culvert, in place	3.50	7.00
870 lin. ft. 18-in. dia. C.M.P. culvert, in place	6.00	7.20
1,680 lin. ft. 24-in. dia. C.M.P. culvert, in place	10.00	10.00
495 lin. ft. 36-in. dia. C.M.P. culvert, in place	15.00	14.00
3 ea. inlets, in place	150.00	150.00
12 ea. seep rings, in place	150.00	115.00
50 cu. yd. concrete	85.00	50.00
180 cu. yd. concrete for revetment rock, in place	50.00	70.00
9,300 cu. yd. base course, in place	2.45	1.85
2,350 cu. yd. crushed stone leveling course, in place	2.45	2.15
55 ton MC-2 prime coat, in place	60.00	47.00
75 ton asphaltic cement (150-200 pen.), in place	55.00	45.00
1,100 cu. yd. mineral aggregate, in place	4.50	4.25
21,300 cu. yd. ballast material, in stockpile	2.50	1.50
21,000 cu. yd. loading ballast	.35	.28
10,100 ea. cross ties, treated	4.75	5.00

WATER SUPPLY—5,000,000-gal. water reservoir

Washington—Pasco—City. Valley Construction Co., Seattle, submitted a low bid of \$168,914 before the City of Pasco for construction of a reinforced concrete 5,000,000 gal. water reservoir. Unit prices were as follows: (Figures include Washington State sales tax.)

(1) Valley Construction Co.	\$168,914
(2) Max Kunej	179,297
Joe Lundberg	187,875
Ruud Construction	190,649
Murray Construction	193,969
Lewis Hopkins Co.	194,369
Lee Hoffman	194,446
Atlas Construction Co.	197,468
Hall Atwater Co.	198,887
Erwin Construction Co.	200,576
Sound Construction & Engineering Co.	204,365
Freigang Construction Co.	205,268
Mathew McCarthy	207,110
Everett L. Wiggins	215,622
Cisco Construction Co.	216,950
Buchanan, Sather & De Rycke	219,996
Paul Jarvis, Inc.	221,659
J. M. Collins	227,904
Young & Smith	229,662
Everett McKeller	234,108
Louis Elterich Co.	234,313
G. T. Gentle & Schmiedeskamp	236,238
Marshall Construction	236,404
Engineer's estimate	231,618

	(1)	(2)
Lump sum, clearing and preparation of site	\$2,000	\$1,500
Lump sum, access road construction	\$1,000	\$2,000
900 cu. yd. gravel surfacing	3.50	3.20
18,650 cu. yd. common excavation for res.	.20	.44
2,253 cu. yd. structural and trench excav.	1.00	1.00
100 lin. ft. placing 36-in. steel pipe	2.00	9.00
103 lin. ft. placing 20-in. steel pipe	1.25	7.50
Lump sum, placing steel fittings	200.00	700.00
3 ea. placing 4-in. C. I. flg. gate valve	50.00	80.00
1 ea. placing 6-in. C. I. flg. gate valve	50.00	35.00
1 ea. placing 20-in. C. I. flg. gate valve	200.00	230.00
1 ea. placing 36-in. C. I. flg. gate valve	200.00	415.00
600 cu. yd. gravel for foundations	5.00	4.50
643 cu. yd. trench backfill	1.50	1.00
1,613 lin. ft. expansion joint footings	.85	1.50
328,000 lb. furn. and place bar reinforcing steel	.10	.105
40,530 sq. ft. furnish and place wire mesh	.105	.10
2,185 cu. yd. furnish and place concrete	40.75	44.00
2,749 lin. ft. furnish and place expansion joints	3.48	1.70
650 lb. furnish and place misc. steel	.85	.70
Lump sum, furnish and place iron and other items	\$6,000	\$6,000
315 lin. ft. furnish and place fence	4.15	3.90
Lump sum, electrical work	\$1,050	410.00
Lump sum, cleanup and landscaping	\$1,000	485.70

Another machine has been added to the "KOEHRING Work Capacity" team

NEW KOEHRING 15-TON 1/2-yd. 205

LIFTS 15 TONS on rubber

With its maximum 15-ton lift capacity, this new Koehring 205 Truck Crane brings you a big plus in work capacity at "1/2-yd." price.

LIFTS 10 TONS on crawlers

As a crawler crane, heavy-duty 205 has 10-ton capacity . . . and boom lengths from 30 to 50 feet.

1/2 TO 3/4-YARD clamshell or dragline

Extra work capacity lets you handle 1/2 to 3/4-yd. clamshell or dragline buckets on wide work range.

1/2-YARD dipper capacity

This 205 is also available as 1/2-yd. shovel or hoe. Hoe digs 17 3/4 feet deep . . . up to 32 inches wide.

WITH ANY ATTACHMENT HERE'S WHAT YOU GET:

- On rubber-tired mounting, 32 1/2 m.p.h. travel speeds.
- On standard or extra-long crawlers, 16, 20 or 24" shoes.
- Automatic traction brakes on crawlers.
- Only 2 major shafts in upper machinery.
- Antifriction power flow for dig, lift, swing, and travel.
- 4 separate adjustable hook-rollers.
- Big 20" clutches, self-adjusting.

Before you invest in any excavator or crane, be sure to check with us on this new 1/2-yard, 15-ton 205.



American Machine Co., Spokane, Washington
Pacific Hoist & Derrick Co., Seattle, Washington
Columbia Equipment Co.,
Boise, Idaho; Portland, Oregon
Marron, Rickard & McCone Co. of Southern
California, Los Angeles, California

Kimball Equipment Co., Salt Lake City, Utah
Neil B. McGinnis Co., Phoenix, Arizona
The Harry Cornelius Co., Albuquerque, New Mexico
San Joaquin Tractor Co., Bakersfield, California
Engineering Sales Service, Inc., Boise, Idaho
McKelvy Machinery Co., Denver, Colorado

Standard Machinery Co., San Francisco, California

ENGINEERS on the move

Frank E. Andrews as of January 1 was named acting division engineer in charge of the Portland office of the U. S. Bureau of Public Roads. He had been principal assistant to the Portland division engineer since 1933.

Fred J. Myers of the Western headquarters office of the Bureau of Public Roads, has left the Bureau to become highway engineer-economist on the staff of the Western Highway Institute, San Francisco, a motor carrier industry sponsored research and engineering organization in the eleven Western states and Alaska.

Arthur C. Hodges and Tom L. Wright, both zanjeros of the Salt River Valley Water Users' Association, Phoenix, Ariz., tied for second place in the Salt River Project employee suggestion contest and received cash awards. Hodges suggested a new locking system for forebay gates, and Wright recommended a lock nut be placed on gate stems to prevent bending.

The Federal Power Commission has unanimously reelected Commissioner Claude L. Draper to serve as its vice chairman during the calendar year 1954. Draper has served his native state of Wyoming in a number of public offices and at one time was a member of the Wyoming House of Representatives.

A. V. Williams has retired from the Bureau of Public Roads after a service of 39 years with the Federal Government. His first job was with the Forest Service at Missoula, Mont. Subsequently he transferred to the Bureau of Public Roads at Denver. From 1945 to 1950, he was district engineer for the Bureau for the state of Colorado. From 1951 until his retirement he served as Division Engineer for the Bureau in Turkey.

George McGee, city engineer of Coos Bay, Wash., since February, 1952, recently retired.

Martin C. Polk, civil engineer of Chico, Calif., has announced his semi-retirement from the engineering firm of Polk & Batham, henceforth acting

as an advisory consultant. Allen Replogle, a former engineer with the USBR has joined with Oscar Batham in the Chico firm.

Cecil D. Kinder, for the past six years county engineer of Benton County, Wash., has accepted a similar appointment with Clark County, succeeding Fred Gloor, who resigned to enter private practice.



Bernard A. Vallerger
managing
engineer of
Pacific Coast
Division,
The Asphalt
Institute

Bernard A. Vallerger, formerly of the engineering faculty of the University of California, and a research engineer on the staff of the Institute of Transportation and Traffic at UC, has become managing engineer of the Asphalt Institute's Pacific Coast Division at San Francisco. He succeeds to the position vacated when Arvin S. Wellborn became chief engineer of the Institute in New York City. Vallerger is a member of the American Society of Civil Engineers, American Society of Testing Materials, Association of Asphalt Paving Technologists and the American Society of Engineering Education.

John R. Gray has resigned as city engineer of Baker, Ore., to become county engineer and road supervisor for Umatilla County.

J. Frank Ward was recently appointed managing director of the Washington State Power Commission. He has held the post of City Light superintendent for many years.

Welton Becket, Los Angeles architect, recently returned after a six weeks trip, during which he conferred with the heads of three governments: with President Eisenhower in Abilene, Kans., with President Naguib of Egypt in Cairo, and with President

Juan Batista of Cuba in Havana. Becket discussed with President Eisenhower the Eisenhower Foundation Building in Abilene, on which he had been architectural supervisor. With the other two notables he discussed the two Hilton hotels to be erected in their countries, on which Becket's firm is architect.

William A. Pearl, director of the Institute of Technology at Washington State College, has been named new Bonneville Power Administrator. Dr. Pearl succeeds to the post left vacant when Dr. Paul J. Raver resigned to become superintendent of Seattle City Light in January. The new power administrator brings to his latest post a varied career in education, research and industry, including a year as acting president of Washington State College, his alma mater.

Clyde H. Spencer, who has been supervising engineer of the USBR California projects office in Sacramento since Region II was abolished some months ago, has been appointed regional director of the reestablished Region II.

A. N. Talcott has been named city engineer of Riverton, Wyo. Talcott recently was with the Bureau of Reclamation in Alaska.

J. Frank Ward was recently selected as managing director of the Washington State Power Commission. He has been superintendent of Tacoma City Light for the past seven years and prior to that time was manager of the Puget Sound Division of the Bonneville Power Administration.

Roger Ernst has been named Arizona State Land Commissioner, filling the vacancy resulting from the recent death of W. W. Lane. Ernst is a former official of the Salt River Valley Water Users Association in Phoenix with which he had been associated since 1950 when he came from Colorado to join the engineering staff of the organization.

John W. Brown has opened his own office in Reno, Nev., for the practice of civil engineering. Since his graduation from the University of Nevada, he has worked for the Nevada Highway Department, Kaiser Engineers and H. M. O'Neil Co. Brown is a junior member of the Sacramento Section of the American Society of Civil Engineers.

Others among the younger engineers of Nevada who are located in Reno are: Tom Meredith, chief engineer for Martin Iron Works; Paul

Reimer, in charge of concrete block operations at the Ready-Mix Concrete Co.; "Buzz" Mechem, engineer for Sierra Machinery Co., Inc.; Wallace Rabenstine, engineer with the Nevada Fish and Game Commission, and Vern Meiser, Warren Meacham, Eugene Sprout and Ray Saibini, with the Sierra Pacific Power Co. William Nagle is with the State Department of Highways in Carson City.

As the Hungry Horse project passes from the construction phase to operations and maintenance, Eugene L. Gochbauer is scheduled to take over the top Bureau of Reclamation job there as superintendent. E. J. Nieman, project construction engineer, has resigned to become liaison engineer for Charles T. Main, Inc., on the Sariyar project in Turkey.

M. Boyd Austin, an employee of the Bureau of Reclamation for the last eighteen years, has been made assistant regional project development engineer in the Bureau's office in Boise, Idaho, replacing O. M. Browne, who was elevated to regional project development engineer in Boise.

Harry W. Bashore, former commissioner of reclamation, and federal government representative on the Upper Colorado River Commission since its formation four years ago, has resigned.

Richard L. Earnheart, in charge of installation of electrical machinery for the Army Engineers at McNary Dam, has been named resident engineer at McNary. He succeeds Al Davis, who has been assigned to Fort Belvoir, Va.

Gordon Herkenhoff and William J. Turney, who have operated a firm of consulting engineers in Santa Fe, New Mex., for the past six years, have dissolved partnership, each intending to operate his own consulting office.

Victor Grey has accepted an appointment as city engineer of Cle Elum, Wash., resigning from the Seattle engineering department to accept the position.

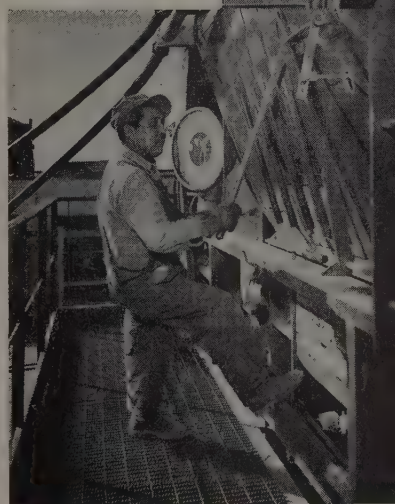
A. Segel, formerly city engineer of Fresno, Calif., has been named to the City Commission as public works commissioner.

In a series of changes at the first of the year, O. C. Struthers and others of the Raymond Concrete Pile Co. organization in the West have taken on new duties. Struthers, formerly Pacific Coast manager, has been appointed assistant vice president, with

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So Rugged—



Easy motion type controls and scales are located so as to provide a minimum of movement and effort by the operator.

4000 lb. capacity plant at Industrial Asphalt, Los Angeles, California

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Standard Asphalt plants are used internationally on the basis of superior performance. Contractors know that the Standard reduces costs for three reasons: 1. Dependability; 2. Greater capacity; 3. Smoother all-around operation. From extra large dryer capacity to oversize elevators, balanced flow assures economy, smooth operation and high capacity. Write today for the location of the Standard Plant nearest you and see for yourself. Study the RB's advanced features and you'll realize Standard builds the most modern asphalt plant. Unit built in seven sizes—1000 to 6000 pounds batch capacity

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HERE ARE the new officers of the Colorado Building Chapter, Associated General Contractors, which elected **Nicholas R. Petry** of N. G. Petry Construction Co. to serve as its 1954 president. He succeeds **Gerald H. Phipps**. From left: **Walter L. Meyer**, Meyer Construction Co., treasurer; **William S. Hibberd**, secretary-manager; **Petry**; **Keppel Brierly**, J. & K. Construction Co., vice president; **David A. Olson**, Olson & Hart Construction Co., secretary. Headquarters are in Denver.

the following territories under his jurisdiction: Los Angeles, San Francisco, Portland, Seattle, Vancouver, B. C., and Salt Lake City. His headquarters will be in Los Angeles, where **Ray F. Logan, Sr.**, becomes assistant district manager for the Southern California area.

At the same time **C. R. Graff** has been promoted to district manager in charge of the company's Northern California operations, with offices in San Francisco. **Alf Hjort**, formerly resident manager in Portland, is now district manager for the Portland and Seattle territories.

At the annual meeting in New York City, the Board of Directors of The Asphalt Institute, representing the major portion of the petroleum as-



Raymond Harsch
chairman of
the executive
committee of
The Asphalt
Institute

phalt production industry, elected **Raymond Harsch**, manager of the asphalt department of Shell Oil Co., San Francisco, Calif., chairman of the executive committee for 1954, and re-elected **Bernard E. Gray**, president.

Grant K. Borg, associate professor of civil engineering, University of Utah, has been elected president of Intermountain Section, American Society of Civil Engineers to serve in 1954, succeeding **Clyde D. Gessel**. Other new officers are **Harold W. Chase**, hydraulic engineer, U. S. Geological Survey, vice president; and

CALENDAR

Feb. 17—Building Industry Conference, 3rd annual conference at the University of Colorado, Boulder.

Feb. 19-20—National Society of Professional Engineers, spring meeting, at Hilton Hotel, Albuquerque, N. Mex.

Feb. 22-25—American Concrete Institute, 50th annual convention, at Shirley-Savoy Hotel, Denver, Colo.

Feb. 25-26—27th Annual Highway Conference, at University of Colorado, Boulder.

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

March 1—Hawaii Section, ASCE, annual convention, at Queen's Surf, Honolulu, T. H.

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.

April 30-May 1—Northwest Conference, ASCE, annual meeting, at Spokane, Wash.

May 27-29—California Society of Professional Engineers, annual convention and trade show, at Mark Hopkins Hotel, San Francisco.

Sept. 16-18—Western Association of State Highways Officials, 33rd annual conference, at Challenger Inn, Sun Valley, Idaho.

J. W. Odell, assistant district engineer, USGS, secretary-treasurer.

Horace J. Whitacre, consulting engineer, is the new president of Tacoma Section of the American Society of Civil Engineers, succeeding **Arthur M. Buell**. Others elected are **Charles C. McDonald**, vice president; and **George H. Andrews** and **Harold A. Hagestad**, three-year directors.

J. T. R. McCorkle, for the past fifteen years secretary-manager of the Idaho Branch of the Associated General Contractors, has retired from that position but remains at the Boise headquarters office as registrar for the Idaho State license board. He is succeeded as secretary-manager by **John T. Molitor**, who has been connected with the firm of J. A. Terteling & Sons, Inc.

Olav Boen of Boen-Koon Construction Co., Seattle, was elected 1954 president of Seattle Chapter, Associated General Contractors, succeeding **Winston D. Brown**. Others elected to



Olav Boen
1954
president of
Seattle Chapter,
AGC

serve the Chapter in 1954 are: **Paul N. Odegard** of the Odegard Construction Co., vice president; **Donald L. Clark**, of W. G. Clark Co., vice president; **Gordon A. Mowat** of A. F. Mowat Construction Co., secretary, and **Arthur P. Jentoft** of Jentoft & Forbes, treasurer. The following will serve on the executive board: **John Boespflug** of J. C. Boespflug Construction Co.; **David Brazier** of Brazier Construction Co., and past president **Brown**.

John H. C. Roberts, Reno general contractor, was elected president of the Nevada Chapter of the Associated General Contractors to serve during 1954. Other officers elected include **Howard Wells** of Wells Cargo, Inc., first vice president; **Rodney Boudwin** of Walker Boudwin Construction Co., second vice president; **C. V. Isbell** of Isbell Construction Co., Inc., treasurer. **Edward L. Pine**, secretary-manager, was reappointed.

Harry Heuer has been elected 1954 president of the Oregon Building Congress. Other officers elected are: **Ray F. Wimer**, vice president; **Clyde Keller, Jr.**, secretary, and **Frank Gomersall**, treasurer.

DEATHS

Hugh A. Stoddart, Alaska division engineer for the U. S. Bureau of Public Roads, died unexpectedly in Portland, Ore., Dec. 20. He was in Portland preparatory to taking over the duties of division engineer there on the retirement of W. H. Lynch on January 1.

John De Luca, 70, widely known in road tunnel construction in the West, died Dec. 23 at his home in Oakland, Calif.

Chester L. Barger, 61, construction man of Central Valley, Calif., died Dec. 3 in a Redding hospital.

Harry A. Grabow, 53, superintendent of construction for McGonigull Construction Co., McCall, Idaho, died at his home there on Dec. 21.

James R. Griffiths, 64, long-time construction man and contractor, died at his home in Reno, Nev., Dec. 29.

Nicholas W. Irsfeld, 75, until his retirement in 1948, project engineer of the Yakima Indian Irrigation Project, died in Yakima, Wash., Dec. 25.

John C. Shield, 71, retired contractor, died Dec. 23, in Tucson, Ariz., where he resided since 1940.

Gerald Pengelly, 64, maintenance and construction foreman of the Washington Water Power Co., died in Spokane Dec. 27.

Harry Johnson, 70, brick contractor of Sacramento, Calif., died suddenly Dec. 28.

G. H. Macrum, 72, retired civil engineer, died Dec. 7 in Portland, Ore.

Clifford L. Strother, 53, grading contractor of Sacramento, Calif., was fatally injured in a hunting accident near Yuba City Dec. 11.

Gustaf A. Gaultland, 70, general superintendent of Kemper Construction Co. for 37 years, died in Alhambra, Calif., Dec. 5.

Cecil B. Hopkins, 70, founder and president of the Steelform Contracting Co., San Francisco, Calif., died after a short illness on Nov. 19.

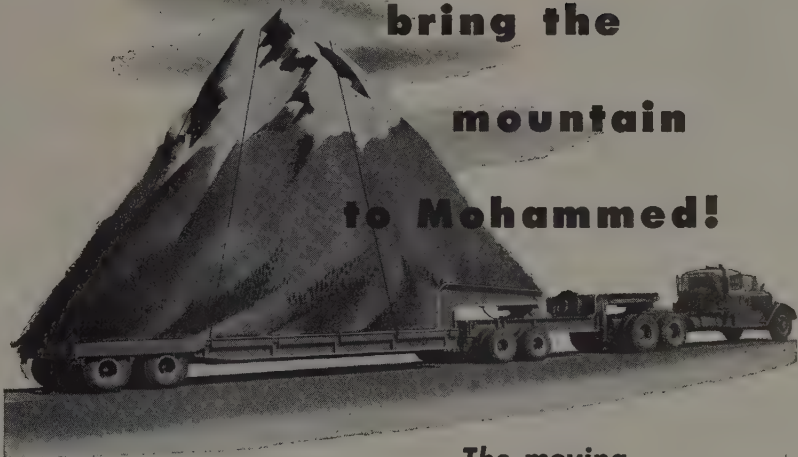
John M. Dodds, 61, General Electric consulting engineer, died at his home in Los Altos, Calif., Dec. 3.

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bring the

mountain

to Mohammed!



The moving

of a mountain...

is no longer impossible with the present day earth-moving and excavating equipment in the construction field.

However, with equipment of this size, especially engineered trailers must be used to move them from job to job.

Utility is proud of their record with progressive operators all over the West who depend upon them to build equipment for this difficult task — men who know from experience that Utility Trailers will operate year after year with greater dependability and lower maintenance cost.

If your hauling requirements need especially designed equipment, or a standard trailer, UTILITY is your best buy.

The sales representative in your area (they're in every principal Western City) will be glad to explain in detail why the name UTILITY is the recognized standard of trailer quality.



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UTILITY TRAILER MANUFACTURING CO.
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SUPERVISING the jobs

J. P. Williams is supervising a sewer job at Los Angeles, Calif., for the Arundel Corporation and L. E. Dixon Co. who got the contract on a bid of \$3,167,710. J. DeMileta is supervising the tunnel work. P. F. Swartz is in charge of the office.

Earl Rook, superintendent, heads the erection of one rigid frame and two continuous slab span bridges in Crook County, Wyo., for N. A. Nelson Construction Co., who was awarded the contract at \$178,970.

B. W. Porter, project manager, and E. V. Shields, project superintendent, head the construction of six underground waste disposal tanks at Hanford, Wash., a \$1,724,845 contract recently awarded Gaasland Co., Inc. L. H. McDaniel is assistant superintendent and engineer, and R. G. Gaasland is office manager.

R. E. Martin and B. N. Martin head up a job in the vicinity of Casa Grande, Ariz., entailing 3½ mi. of

grading and seal coat on State Highway 84. The Martin Construction Co. recently won the contract on a bid of \$114,260. Earl Nelson is foreman on the job.

Charlie Luttrell, superintendent, assisted by foreman C. T. Lobb, is in charge of a \$110,100 contract held by Jack Adams for road alterations and improvements at Los Alamos, New Mex.

E. M. Penn is project manager, Ed Herring, Jr., job foreman, and Art Adams, job engineer for the Penn Construction Co. on a \$153,950 contract for a 3-mg., cut-and-fill type reinforced concrete reservoir under construction at Anaheim, Calif.

"Chet" Nelson, general superintendent, and Elon C. Berkman, job superintendent, head the men working for V. R. Dennis Construction Co. on the 1.3-mi. job of grading and surfacing in San Diego County, Calif., a \$133,884 contract. Other key personnel are: W. J. Garfield, equipment

superintendent, Bill (Hardrock) Harville, plant superintendent, and A. E. Thurston, engineer.

Bob Wagner in his capacity as foreman is handling the job of building the 8,184-ft. Valley Vista supply line at Hemet, Calif., for Elledge Bros., who recently received the contract at a cost of \$150,360.

John H. Match, project manager, Ken Lowe, construction superintendent, and A. E. Smith in charge of engineering and the office, are the key personnel for Match Bros. and Lowe & Watson, contractors doing the runway and taxiway extension work at Norton AFB in California. This is a \$551,000 contract.

D. Boyd Robinson is job superintendent for The O'Neill Construction Co., who on a bid of \$231,941 won the award for 9 mi. of grading, gravel surfacing, etc., in Phillips and Valley counties, Mont. Harold Blair is mechanic superintendent. These two men are also supervising a \$114,118 road job for this contractor in Hill County, Mont.

Don McGuire is superintending the \$434,335 contract held by C. L. Hubner Construction Co. for 3 mi. of construction on State Highway 8 in Adams and Arapahoe counties, Colo.

George J. Renaud, project manager, Garnard Keller, general foreman, Richard Smith, project engineer, and James V. Minton, office manager, are the key personnel on a \$889,045 contract of the D & H Construction Co. for work on the Columbia Basin Project, Wash., consisting of earthwork, pipe lines and structures, Eltopia Branch Canal, and North Part, Unit P-9, Potholes East Canal laterals.

Walter F. Haines, general manager and superintendent, with Christ Popovich, general superintendent, Melvin McCalmant, project manager, and George Popovich, office manager, heads the Culver City, Calif., sewer project for the Economy Sewer Construction Co., one of the younger contracting firms in the West, who won the award on a low bid of \$236,310.

Sterling Ewing, general superintendent; George Naill, project manager; E. R. Peterson, project engineer, and W. D. Brooks, office manager, comprise the top personnel on the \$10,000,000 contract held by Sanderson & Porter on the steam generating station being built for the Tucson Gas, Electric Light & Power Co. at Tucson, Ariz. Other top personnel are R. E. Dunn, chief electrical engineer; J. A. Walters, chief me-

SOME OF THE BOYS on the big pile driving job being undertaken by Raymond Concrete Pile Co. (see page 59)—Front row (l. to r.) Albert Schug; Jim Whitmore; Pete Franco; Chuck Lowe, liftman, and Carl Bergstrom, foreman. Second row (l. to r.) Clarence Vivion, engineer; Thomas Stratton; Edmund R. McCullough.





‘How’s the engine doing, Mr. Denti?’

We asked Mr. George J. Denti, Secretary-Treasurer of the Montuoro Contracting Corp., Bronx, N. Y., that question *twice* about the Cat* D13000 Engine in this Bucyrus-Erie crane with 65-foot boom and 1-yard bucket.

The first time was in June, 1952, when this picture was taken of the rig working on the Bronx River Parkway.

The second time we asked him was more than a year later — September, 1953.

Both times Mr. Denti’s answer was the same: “We’re very well pleased with its performance.”

Again and again you’ll hear similar reports from men like Mr. Denti who keeps a close check on costs and production. In rig after rig, Caterpillar power helps deliver more work at lower cost with less down time.

What’s in it for you when you specify rugged yellow diesels for your machinery? Many advantages! For example, you get honest HP—the horsepower listed on the specification sheet is conservative, not the stepped-up rating of a stripped-down unit. You get steady production—day

after day with a minimum of attention. What’s more, you get low-cost production. These thrifty engines burn low-cost fuel without fouling. And if you need service, you get it fast — on the job — from your Caterpillar Dealer.

Next time you order replacement power or new machinery, specify Cat power. More than 150 manufacturers can supply these durable engines—in 12 sizes up to 500 HP—in their equipment. They’re built for a long life of profitable production. Ask your dealer to *show* you proof!

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**SPECIFY CAT POWER
FOR HIGH-PROFIT
PRODUCTION**

chanical engineer; **Andy Pollina**, mechanical superintendent, and **James M. Bell**, chief field engineer. Foremen on the work are: **Dewey Farr**, rigging; **Alex Parker**, carpenter; **H. A. Johnson**, millwright; **L. E. Cloudt**, general electrical; **Ernest Tee**, piping; **J. A. Rhoad**, boiler, and **J. C. Ramirez**, labor. **M. M. Sundt Construction Co.**, excavation and foundations subcontractor, has **C. H. McCormick** in the superintendent position.

Carrol T. Glenn and his assistant **Joe Mabery** head the construction forces for **Guy F. Atkinson Co.**, who has the \$313,000 job for construction of **Pier C** at **Long Beach harbor**, Calif. Other key men on the job are **W. H. Bates**, **Dick Carscallen** and

Garland Gay, foremen, as well as **Hardy Clark**, labor foreman. **Bill Huseman** is engineer and the office is in charge of **Charlie Atkinson**. **Tom Sawyer** is also on the job as foreman for **Soulé Steel Co.**, subcontractor.

W. A. Dirst, assisted by **R. Winters**, is supervising the erection of the **Tucson News building** going up in **Tucson, Ariz.** Also working at the site for **M. M. Sundt Construction Co.**, who got the contract on a \$500,000 bid, is **R. Reddoch**, labor foreman.

R. G. Fleming, project manager; **Mel Shelstad**, housing superintendent; **J. W. Ford**, job engineer, and **T. P. Kohl**, job office manager, are among the top personnel of **Del E.**

Webb Construction Co., who is putting in a complete townsite development, both housing and commercial, at **San Manuel, Ariz.**, the initial 1,000-unit of which is scheduled for completion this summer. Grading superintendent is **Otto Christiansen**, and **Frank Warren** is concrete superintendent. General foremen are **C. Yarbrough**, carpenter, and **Ben Johnson**, labor. **L. L. Dugan** is master mechanic. Resident engineer for **Falcon Engineers** is **C. R. Emmons**. When completed, the town (est. population 10,000) will extend from **Cactus Patch** to **Modern City**, and is being built for the **San Manuel Copper Corp.**

Bill Flynn is "Jim" Ray's superintendent on a new warehouse and office building in **Southern California** being constructed for **Al Levinson**.

R. W. Baker, superintendent, with the assistance of foreman **Herman Meinert**, is supervising the construction of the **Wilmington Junior High School** at **Wilmington, Calif.** **Carter-Mack Builders** is doing the work at a cost of about \$450,000.

Axel Nordstrom, superintendent; **F. H. Kaiser**, project manager, and **Lew Corbitt**, project engineer, are the top construction personnel for **George A. Fuller Co.**, who is erecting a \$2,000,000 "oceanarium" on **Palos Verdes Cliffs** in **Southern California** for **Marineland of the Pacific, Inc.** This aquarium will be a more costly one than the celebrated one in **Florida**. Also working on the project are **Frank Friesen**, carpenter foreman, and **E. E. Leggett**, labor foreman. **C. S. Pherigo** is managing the office; **R. B. Hancock** is timekeeper.

Norman L. Fredricks, project manager, **Jacob L. Huff**, project engineer, and **Bob Ingersoll**, project superintendent, comprise the top supervisory force for **Newbery Electric Corporation** who is doing the electrical and mechanical work on the **Richmond-San Rafael bridge** in **California**. Bid price was \$1,020,940.

Andy F. Weesner and his assistant **Harry Schuettz** are in charge of a \$503,459 contract of **Clyde W. Wood & Sons, Inc.**, for 6.3 mi. of grading and surfacing and widening of a bridge between **Jackson** and 1 mi. from **Pine Grove**, **Amador County, Calif.** Engineer for the job is **C. E. Hughes**; master mechanic, **Vic Wright**, and timekeeper, **Tom Condon**.

Jim Stinson is general superintendent and **C. E. Kasler** is acting as project manager on a \$609,625 contract for runway and taxiway extension at the **Victorville airport** in **California**,

Everything but the champagne

ONE OF THE most publicized launchings in the West recently took place on the beach at **San Francisco's Aquatic Park**. **Dave Devincenzi** of **Devincenzi & Haskins** can tell you all about it.



THE SUBJECT: The **Fort Sutter**, an old river boat which had been beached by a promoter who felt that the vessel, when used as a showboat, would be a monument to the city's already illustrious past. But civic authorities ordered the boat from the beach.



THE LAUNCHING: To be carried out during the highest tide of the year. Here **Dave Devincenzi** in his **Cat D-6** is removing sand from the vessel's seaward side. This operation took three days, during which some 5,000 cu. yd. of sand were moved, much of which was washed back with each tide. **Dave** was hired to use his **Cat D-6** for vanguard maneuvers prior to the actual launching or de-beaching by tugboat operations. In the background are a few of the 4,000 sidewalk superintendents on hand for the momentous occasion.



CLOSE-UP: **Dave** at the controls. He also had to remove sand from around the **Fort Sutter's** hull so that caulkers could repair holes made by its 10-mo. sojourn on the beach. The constant salt water bath made it necessary to give the **Cat** a twice-daily grease job. **NOTE:** After the second attempt at launching the vessel got sufficiently offshore to begin sinking. She was then pushed back to the beach where she now rests in 20 ft. of water—and may be there to stay!

recently awarded to Fredericksen & Kasler. Other key men on the project are: **George Bell**, plant superintendent; **"Groutin" Beatles**, pipe foreman; **Marvin Sandlin**, dirt foreman; **Jack Martin**, street foreman, and **Jesse Saylor**, structure foreman. **George Shaffer** is chief engineer and **M. E. Burke** is office manager.

T. A. Close is superintending the construction of a steel and concrete bridge over the Swan River in Flathead County, Mont., for **N. A. Nelson Construction Co.**, who recently secured the contract at \$124,364. **Gary Best** is carpenter foreman on the work.

George W. Bender, **Paul Pond**, **Tony Ibeck** and **John Schofield**, supervisory personnel on Kaiser's Hanford works contract in Washington, have been transferred to Riverdale, No. Dak., where Kaiser is a joint venture contractor on Garrison Dam powerhouse.

Wesley (Ole) Orrestad is superintendent for **H. Halvorson, Inc.**, on a \$822,000 Navy contract at **Widby Island, Wash.** **"Mac" McKown** is assistant superintendent and carpenter foreman. Contract consists of a central heating plant and operations building, including exterior facilities.

Ray Corn, superintendent, and **H. S. Thompson**, project manager, are handling the grading and paving and erection of five bridges on the **Santa Ana Freeway**, **Orange County, Calif.**, for **Winston Bros. Co.**, who secured the contract on a bid of \$1,958,110.

Kenneth Ethridge is superintendent and **T. E. Moore** is project manager for **Pioneer Constructors** on 5½ mi. of grading and surfacing on the **Florence-Tucson highway** in **Arizona**, a \$287,522 job. **Red Ashworth** is grade foreman and **Floyd Bain** is crusher and plant foreman.

R. A. Healey, superintendent, and **E. B. Potter**, project manager, head the list of supervisory personnel on **Morrison-Knudsen Co., Inc.'s** \$777,-105 award for putting in 3 miles of **Northern Pacific track** at **The Dalles Dam site**. **W. C. Perkins, Jr.**, is assistant superintendent; **L. J. Byers**, master mechanic, and **L. O. Walton**, office manager.

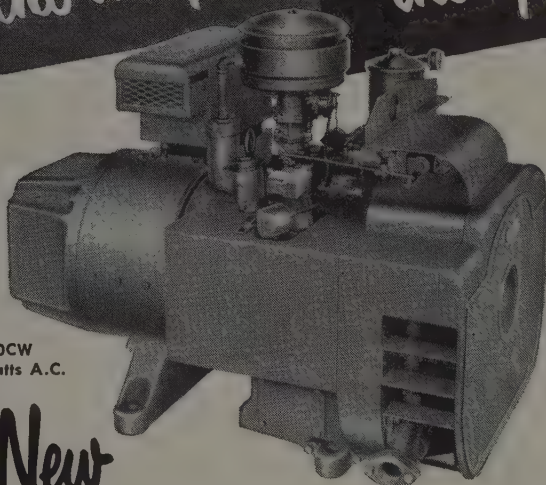
Everett Hollingsworth is grading superintendent on **Northwestern Engineering Co.'s** \$293,001 award for a 7-mi. highway job in **Big Horn County, Mont.**

Charles A. McMahon, project superintendent, has the assistance of a

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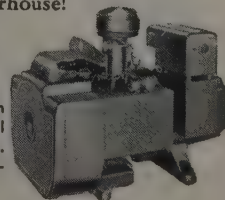
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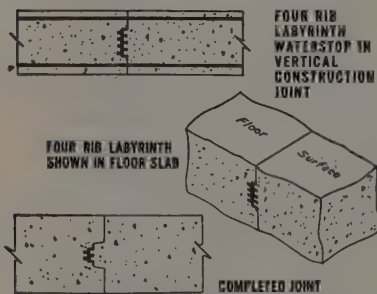


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HERE ARE some of the key men on the Anheuser-Busch Brewery job in Los Angeles: Front row (l. to r.) Cliff Lawler, Jerry Corpolongo, Charles A. McMahon, Al Nelson, Emmett Riley, Gus Dahlin. Second row (l. to r.) John Roe, Dick Chase, Al Bean, Hap Mazur, Henry Odin, Lee Palmer, Barney Gardner, Charles Bonner, Don Bunge, William Davis, Hobart Smith, Floyd Keith, George Haller, Pete Sorensen.

large supervisory personnel on the erection of the \$17,000,000 Anheuser-Busch Brewery project in Los Angeles under contract to Peck-Cahill Co. Among the key men are the following: W. M. Tennant, office manager; Clifford S. Lawler, personnel supervisor; Mason G. Berridge, paymaster; J. H. Rice, purchasing agent; A. L. Bean, chief surveyor; P. W. Mitchell and Raymond L. Kritser, receiving clerks; H. A. Odin, detailer, and Robert S. Fleischer, clerk. Gunnar Carlson is equipment engineer; L. C. Palmer, project engineer; Earle W. Rutz, cost engineer, and Curtis Peck, plans engineer.

Among the superintendents are Albert Nelson, area; H. R. Chase, equipment, assisted by Gus Dahlin; E. A. Gardner, warehouse; William L. Davis, bottle shop; J. T. Roe, stockhouse; Pete Sorensen, administration building; Lloyd W. Keith, Borsari cellars; Donald H. Bunge, powerhouse, and Rudy Svacha, brew house.

George Paul is general steel foreman; L. Dan Gomes, general concrete foreman, and J. J. Corpolongo, general truck foreman. Others working as foremen are: Carpenter—H. R. Dahlquist, Dell W. Ehrisman, Edward Fitzpatrick, Lyle L. Kittleson, L. S. Marlin, W. N. Muthert, Clayton R. Robinson, Harvey E. Williamson and Dale L. Winder. Labor—Olimpio Buzzimazza, Charley Cammilleri, Louis Casteneda, Louis Coran, L. S. Randall, Manuel B. Solis, M. B. Sanchez, Oliver Starr and Albert Yeakley. Dan M. Barton is millwright foreman; Joe Millman, sewer foreman;

Joseph Salerno, cement finisher foreman; W. H. Berry, steel foreman, and Edward Morse, rigger foreman. Chiefs of party are William R. Moore, Donald E. Shaw and Albert J. Baum. General superintendent for all C. L. Peck contracts is A. B. Standard.

James D. Ricker is project manager on the \$2,000,000 contract of Morrison-Knudsen Co., Inc., for construction of Unit No. 1 of the USBR distributing canal system at Dome, Ariz. J. O. McGinnis is general foreman and Neal Spencer is job engineer. Among the other key personnel are: foremen Bud Snowball, excavation; Max Ware, grade; Jim Cochran, concrete pipe; Les Bishop, concrete, and Clyde Prater, water. Glenn Van Lanningham is master mechanic; C. G. Kincaid, field engineer, and Cy Johnson is in charge of the office. John A. Beltram is handling the reinforcing steel erection for Yuma Steel who is doing this work under a subcontract.

Floyd Packer, general superintendent for Wes Meyer Construction Co., has been heading a \$800,000 contract, now drawing to a close, consisting of the erection of grandstands, tracks, etc., for Greyhound Parks of Arizona, in Phoenix, Ariz. Other key personnel are Ralph Lincoln and Joe Lloyd, carpenter foremen, and DeWorth Brown, concrete foreman.

Among the subcontractor personnel are: Structural steel—Charles Mercer, superintendent and Robert E. Pruitt, assistant superintendent, for Acme Steel Co. Electrical—O. K.

Jackson, general foreman, for **Arthur Electric Co.** Heating and ventilating—**Floyd Green**, superintendent, for **Saffel Air Conditioning Co.** Plumbing—**Roy Parker**, superintendent, for **J. H. Welsh & Son.** Excavating, grading and paving—**Art W. Rogers**, superintendent, for **Tanner Construction Co.**

L. B. Meador is acting as project manager for **Flori Piping Erection Co.**, who is doing the fabrication and piping work for **REA** at **Algodones**, **New Mex.** **Floyd W. Sanders** is assisting as general foreman. **David H. Sena** is office manager.

G. Vella, manager; **Emil Vella** and **Harry Knight**, superintendents, assisted by foremen **Laurence Grix** and **Louie Giannini**, head a \$459,175 contract recently awarded to **G. Vella Construction Co.** covering the installation of sanitary sewers for **Culver City, Calif.** Pumping station was sublet to **C. C. Pasqual, El Monte, Calif.**

Charles Prose is superintendent for **Fisher Contracting Co.** on 1½ mi. of grading and draining on **U. S. 60-70**, **Superior east, Ariz.**, a \$203,418 contract recently awarded to **Fisher.** In charge of the field office is **Dick McNeill.**

Bill Thompson is superintending the runway and taxiway extension work at **Yuma County Airport, Ariz.**, for **Fisher Contracting Co.** who has the \$387,340 job. In charge of the field office is **Jack Start.**

Ken Willis is superintendent for **Fisher Contracting Co.** who recently won a contract on a bid of \$115,140 for firing-in butts, **Luke AFB, Ariz.** General foreman is **Ted Jones.**

Frank Tindall has been named manager of the newly established field office of **Gunther & Shirley, Inc.**, and **E. V. Lane Co.** at **Bridgeport, Wash.** This joint venture firm is the prime contractor on the installing of equipment and completing **Chief Joseph powerhouse**, a \$3,420,000 job. Other key men on the work are **Forrest Risken**, project manager; **William Donaldson**, project engineer; superintendents **George Rhinehardt** (pipe) and **Herbert Schroeder** (mechanical), and carpenter foreman **Dallas Worth.** All were formerly on the **Hungry Horse** project with **Gunther & Shirley.** It will be April, according to reports, before any hiring will be done.

John Silveira is supervising the construction of 6 mi. of grading and paving of a 4-lane divided highway, **U. S. 101, Santa Barbara County, Calif.**, a \$1,019,922 project recently

awarded to the **Madonna Construction Co.** Project engineer is **Don Eichner** and **Dan Borrodarri** is in the master mechanic spot.

Francis D. Barben and **Howard W. Barben**, partners in the contracting firm of **Barben Bros. Construction Co.**, are in charge of the 50-mi. grading contract in **San Juan County, Utah**, recently awarded the firm on a bid of \$73,803.

B. V. Fredrickson, superintendent, assisted by grading foreman **Magor A. Bailey** and paving foreman **Grant Brown**, heads the personnel working on the **Fredrickson & Watson** \$547,-

453 job of grading ramps and paving freeway on **U. S. 101** which will complete the by-pass through **San Luis Obispo, Calif.** **Jim Gahan** is office manager.

Fred Bentley is in the superintendent spot on construction of two dormitories and a hospital at the **Arizona Children's Colony, Randolph, Ariz.** This work is being executed by **D. D. Castleberry**, who won the contract on a bid of about \$300,000.

Bill Harrison and his assistant **Ed Ryan** are superintending the \$433,000 job the **Arizona Sand & Rock Co.** is doing for the **Arizona Highway De-**



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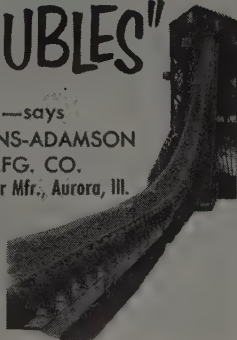


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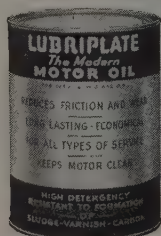


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partment consisting of grading and paving at Phoenix, Ariz. **Floyd Jepson** is master mechanic. **Roy Miller**, project engineer, represents the State. **Ed Webb** is working on the job for Mardian Construction Co., bridge subcontractor, and **Harley Greenleaf** for Hooper Concrete Pipe Co., another subcontractor on the work.

Nick Evans is superintendent for Peter Kiewit Sons' Co., who is doing a \$336,949 job in Fergus County, Mont., consisting of 19 mi. of grading, surfacing and oiling, Arrow Creek-Brooks road. **Don Armstrong** holds the master mechanic spot, and acting as surfacing foreman is **Orville Bronson**. **Carl B. Owens** is office manager.

A subscription renewal letter from a Fluor Corporation man tells us: "Copies of *Western Construction* will get plenty of reading, even down here in the Virgin Islands as all company men are from the West Coast. **Rex Dunn**, project manager—Los Angeles; **John Callicotte**, superintendent—Arizona; **Hal Stevens**, chief engineer—Los Angeles; **Chuck Kramer**, general carpenter and steel foreman—Arizona; **Bob McCutcheon**, general labor foreman—Los Angeles; and **Leo Kamanacki**, concrete foreman—Los Angeles.

"We are on a \$3,000,000 school job for the Department of the Interior on St. Thomas. More West Coast men are doing similar work on St. Croix, also for Fluor. Your magazine keeps us in touch.

"Best regards. **Charles R. Kramer.**"

L. B. Evans is job superintendent for Stearns-Roger Mfg. Co., contractor on the concentrate loading area and scales work just ending for the American Smelting & Refining Co. at Plata, Ariz. Foremen are, **A. H. Bickford**, carpenter, and **Bill Fortenberry**, labor.

W. W. (Bill) Stone has been supervising the steel erection work at the REA steam plant at Albuquerque, New Mex., assisted by erection foremen **C. A. Bowen** and **Ed Bolger**, and riveter foreman **J. J. Parker**. Western Steel Erection Co. is the contractor handling the job.

E. P. Watson is personally supervising the \$103,295 contract recently awarded his firm for installing the Alpine sewer at San Diego, Calif.

Glenn Veater, general superintendent, has been heading the Allison & Haney contract for water feeder lines at Durantes pumping station at Albuquerque, N. Mex., a part of the City water system. Also working on this \$1,500,000 job have been **Carl Veater**

and **Don Brookeson**, pipeline foremen, and structural steel superintendent **J. W. Temple**.

M. (Scotty) Borthwick is superintending the erection of the 12-story Simms Building in Albuquerque, N. Mex., for Lembke, Clough & King who received the contract on a \$2,044,617 bid. General foremen are: **T. L. McCorkle**, **Jim Templeton** and **Harold Peterson**, carpenter; **Frank Reck**, steel; **Harry Smith**, brick, and **A. H. Harris**, labor.

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:

Peter Henderson, 35, a construction worker, fell 105 ft. to his death while working on a suspension bridge being built across the Rio Grande near Belen, New Mex., on December 22. The bridge is for El Paso Natural Gas Co.'s pipeline crossing.

Antonio J. Apodaca, 28, a truck-driver for the M. M. Paul Paving Co. of Albuquerque, New Mex., was electrocuted December 18 after his truck had rubbed the insulation from a cable carrying three 440-v. power lines. He stepped out of the cab and onto the running board to check the load while the truck bed was in contact with the exposed cables.

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

James L. Follis, superintendent of iron construction at the new Electric Cooperative Plant being built at Algodones, New Mex., fell 20 ft. from a beam and landed on a 6-in. bolt projecting from a cement block on December 17. He suffered a deep gash in the back of his head, several broken neck vertebrae, and two broken arms, but hospital attendants said his condition was not critical at last reports.

Two men were injured on December 17 at Spokane, Wash., when a scaffolding on a building construction job collapsed and they fell 15 ft. to rocky ground. **Edward Rossmeier**, 38, suffered back and hip injuries. **Robert McClain**, 24, suffered injuries to his hands.

TRICKS of the TRADES

Maintenance man puts the heat on to remove paint-covered screws

By H. B. McDERMID
Retired Construction Engineer

THE PLANT MANAGER had sent for a man to do some work in his office, and since the manager had just had his office redecorated and was known to be something of a martinet, the maintenance supervisor picked out one of his best men to go.

Arrived on the job, the workman found that the work required was to remove a pair of hinges. These hinges were screwed on the outside of a lately painted door with flush-headed screws, thoroughly painted over, and stuck fast in the countersunk holes in the hinges. Even the slots in the screw heads were full of paint, making it impossible to get any hold on them with a screwdriver, until the slots had been carefully scraped clean—all with due regard for the new white paint surrounding them.

Even then the mechanic found that no ordinary force would budge the screws, and he knew from sad experience that heavy force would ruin the slots in the screw heads or burst off the heads entirely so that no one could make a job of it. He had heard that heating such screws would loosen them so they could be removed, and, being desperate for some acceptable remedy, decided to try it.

He got a large soldering iron good and hot, applied it in turn to each of the screws, and so burned off the paint bond that cemented the screw heads to the iron hinges. The heat also expanded the bodies of the screws and broke loose the "aged in the wood" hold the threads of the screws had in the door and door post. He controlled the location of the hot soldering iron accurately (so as not to damage the nearby paint) by holding his screwdriver very close to the screw head on which he was working then supporting his hot iron across the shank of the screw driver. Thus the iron could be spotted exactly and easily, keeping it just where needed.

After the screws had again cooled down, contracting them away from the wood slightly, he found that the job had changed from one a strong man could not do to one a small boy could do with great ease. No damage had been done to anything but the paint on the screw heads, which could be painted over in a few seconds with an ordinary brush to look as good as before. Not only was the job satisfactory by virtue of its freedom from disfiguring scars, but also the total time spent was much less,

because the screws backed out so easily as to very much more than make up for the time used in heating them. The picture shows clearly the method used in guiding the hot iron accurately to the screw head, thus eliminating damage to the surrounding finish.

Engineers erect bin wall around curves

WYOMING HIGHWAY engineers ran into complications when faced with the job of erecting a 4,000-ft. Armco bin-wall along a causeway recently. The main problem was caused by the fact that the installation had to go around several curves with radii of 50 ft.

The answer was found in simple field fabrication. Individual bins were



set about 5½ ft. apart at the toes. This space was bridged with half stringers cut and punched in the field, thus making an unbroken wall along the toe ends of the bins.

Wave action has taken place against the wall several times since its installation in the summer of 1953. From all indications, the State Highway Department is well pleased with its performance and appearance, and the contractor is pleased that he was able to get out of a tough spot at a satisfactory cost.

Hydraulic fluid use told

A WORD of caution about the use of hydraulic fluid is found in a booklet published by Henry Manufacturing Company, Inc., of Topeka, Kans. It says that, generally speaking, oil used in hydraulic systems should be high-quality lubricating oil, which meets the viscosity requirements of the air temperature. Never, however, should any type of hydraulic brake fluid or aircraft hydraulic fluid be used in the hydraulic system of an earthmoving machine.



Steel strapping used to speed up erection of 21-story hospital

STEEL STRAPPING was used by Anglin-Norcross Corporation, Ltd., of Montreal, Canada, to cut man-hours by almost 80%, simplify tensioning operations, and minimize material waste in fastening floor joist forms to steel I-beams during erection of a 21-story hospital.

In the past, forms have been fastened to steel beams by such costly or time-consuming methods as nailing them to 2 x 4's that cross over the I-beam, securing them with wire wrapped around the form and beam, or supporting them with jacks.

With steel strapping, however, one man can apply 14 straps in 5 min., and two men can hang forms for an entire floor in one day. Formerly, six men required two days to hang forms for a floor with wire. The tensioning tool simplifies the tensioning problem and assures consistent strength throughout the length of the joist. Material waste is completely eliminated because the strap is drawn from a coil and is not cut until it has been tensioned.

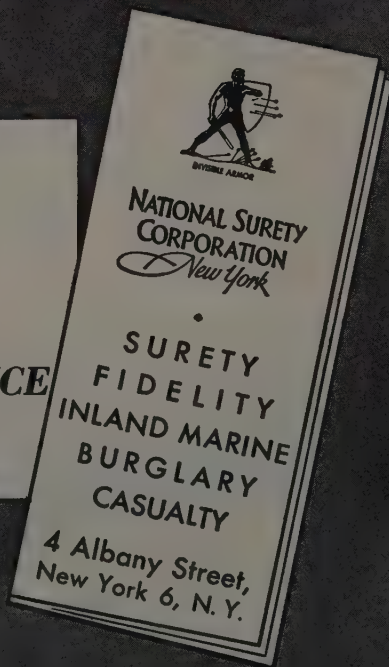
Assembling forms around steel beams involves the following operation: workers lift the base of a concrete form into position with a rope

slip and temporarily secure the form to a beam. Metal spacers, 2 in. in height, are mounted on top of each base in order to keep the forms evenly spaced below the bottom of the beam. These spacers remain in the concrete after the form has been removed. Strapping is then applied around the beam and base. After strapping the base form into position, side panels are nailed to its bottom edge. Wood spacers are placed between side panels and steel beams.

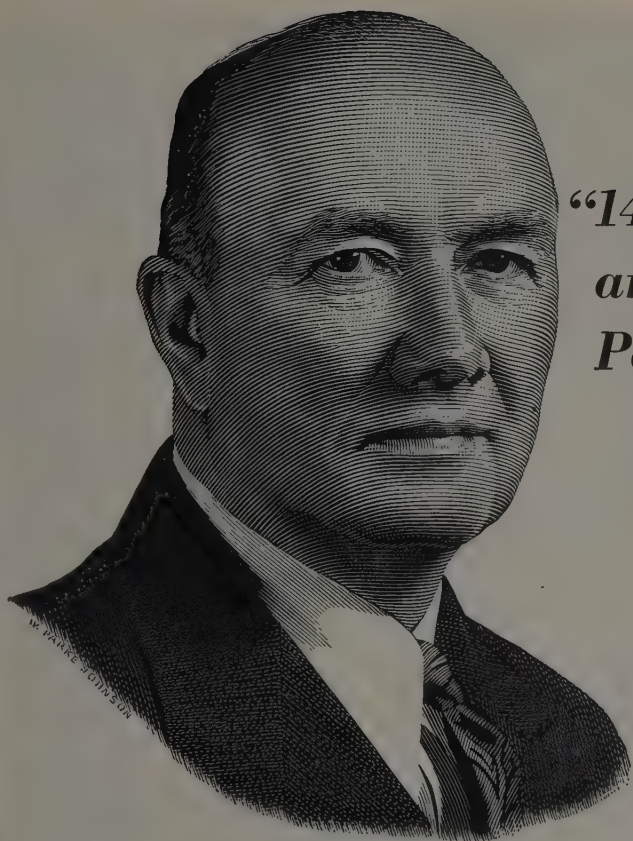
When form hangers are in place, wood floor forms are installed and steel reinforcing rods are placed crosswise over the entire floor area. Air-powered agitators are used in the pouring operation. Floor and beam constructions are poured simultaneously. When the pour is finished, about 3 in. of concrete covers the reinforcing rods. To provide additional strength at points where concrete is forced into the forms, two bands of steel strapping are used. After seven days, the straps are cut and the forms are easily removed. Cement finishers patch the column and floors where necessary. The strapping remains in the concrete and serves as additional reinforcement.



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thousand companies, large and small, are building personal security and contributing to national economic stability by their \$160,000,000 monthly investment in U. S. Savings Bonds. These Payroll Savers, with their \$25 and \$50 Bonds, are major shareholders in a huge reservoir of future purchasing power—the \$35.5 billion, cash value of Series E Bonds outstanding.

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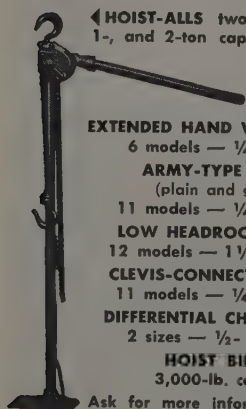
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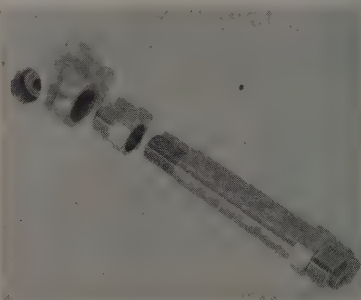


TOOLS of the TRADES

Use the coupon on page 117 for more information on any of these items

201

A DIFFERENTIAL DRY JOINT for high-pressure gas cylinder manifolds is now offered by National Welding Equipment Co. The patented invention is basically a three-part assembly of a socket, a nipple and a bushing. Differences in thread pitch among the parts make it



possible to build up cylinder manifold connections as desired without use of solder or joint compounds to insure leak-tightness. Only a wrench is needed, and the resulting joint may be taken apart and reassembled as necessary, with 100% salvage of the parts.

Threads on the nipple and inside the bushing have less pitch than threads outside the bushing. In use, the bushing is first run well down on the nipple, then threaded into the socket. Turning only the bushing in this latter operation runs it into the socket but not off the nipple, due to the difference in thread pitch. The flat end of the nipple is therefore seated tightly against the end wall of the socket, completing the leak-tight connection.

202

A 24-PAGE BOOKLET on parts kits for Lorain machines in the field has been published by the Thew Shovel Co. It describes and illustrates 40 different kits for a wide range of heavy equipment.

203

DIESEL INJECTOR Tube Service Set No. J 5286 has been announced by Kent-Moore Organization, Inc. It was designed for use on GM diesel engine models No. 2, 3, 4, and 6-71. More information and literature are available. Fill out the coupon.

204

VALVE GAP can be set easily on engines with overhead valves by using the P & G Valve-Gapper, says the manufacturer, P & G Manufacturing Co. It measures the travel of the valve rocker arm before contact with the valve stem. Other uses include visual checking of hydraulic valve lifters, timing injectors, and balancing fuel injector racks.

205

NEW FRAM FILTER—A new filter, claimed to be the most important diesel engine protective maintenance development in 20 yr., has been added to the line produced by the Fram Corp. The new filter, which is supposed to remove 100% of the water from diesel and other fuels,

is a combination unit using replaceable cartridges. Fram engineers say that the unit, which will cost about \$40, will sharply decrease diesel engine injector maintenance and repair costs.

206

THROTTLE CONTROL—Link-Belt Speeder Corp. has designed a throttle control to improve the performance of gasoline- or diesel-powered equipment. Once set, it holds engine speed constant despite vibration, and it can be mounted any place a governor cable can be attached. Folder 2476, which tells all about it, can be obtained by filling in the coupon.

207

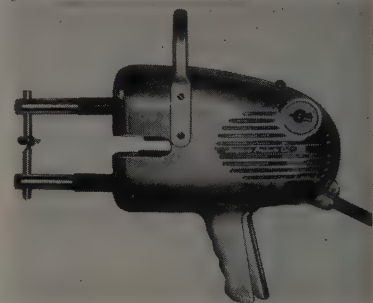
BATTERY REGULATOR—Franklin Products, Inc., has announced its Acutrol regulator, which incorporates a new method of regulating the charging rate for all generator and charging units. This mechanical regulator is reported to deliver 80% more efficiency in all standard batteries and practically eliminate the necessity of adding water. Fill in coupon for more information.

208

COMPLETE SPECIFICATIONS and prices for 52 different portable electric tools are found in a 44-page, pocket-size catalog put out by the Porter-Cable Machine Co. Send in coupon for your free copy.

209

NEW ANGLE HEAD attachment is available from Ingersoll-Rand Co. for use with its line of the electric Impact-



tools. The attachment is available for use with either 1/2- or 5/8-in. square drivers. It snaps on the Impactool just like a socket and can be rotated 360 deg. in relation to the tool handle. It is 3 in. high and 6 3/4 in. long. A cast aluminum housing keeps the weight to a minimum.

210

FASTER WELDING—Turn-A-Weld Products has come out with a Universal Positioner designed to give greater speed for both automatic and manual welding of anything round. This new product, which is adjustable to 40 speeds, features a revolving table adjustable to 60 deg. from center and an 8-in. lathe chuck for welding pipe, tubing, and the like to any desired length. Further information may be obtained by filling in the coupon.



"Century"[®]

ASBESTOS-CEMENT PIPE

**installed in Penna.
State Park**

Hickory Run State Park in White Haven is one of several Pennsylvania Parks in which "Century" pipe has been used to supply water for recreational areas. For generations to come, this line will carry its full capacity, without the need for maintenance.

Long, trouble-free service is to be expected of "Century" pipe. Being non-metallic, this exceptionally strong, durable pipe cannot tuberculate, rust, or corrode. Its bore stays smooth and frictionless, keeping pumping costs low. It is light in weight, easy to lay, low in cost.

Before you decide on the pipe for *any* water-carrying line, for economy's sake you ought to find out all about "Century" pipe. Write for "Mains Without Maintenance"—an informative free booklet of real value to anyone concerned with water main construction.

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Nature made asbestos... Kearsbey & Mattison has made it serve mankind since 1873



Ingenuity makes plant out of patcher in West

INGENUITY on the part of Lee Reid, manager of the Ready Mixed Concrete Co. of Pocatello, Idaho, resulted in the transformation of a Barber-Greene Model 804 Mixall from a combination dryer-mixer for production of hot or cold bituminous mixes for patching to a versatile, hot-mix asphalt plant.

The change was made by placing the Mixall on an elevated platform over a truck driveway. A $2\frac{1}{2}$ -cu. yd. hopper was placed at the feed end of the machine, rigged so it could be charged with a tractor loader, and equipped with a manually-operated, hinged chute.

Aggregate is discharged through the chute into the Mixall's skip, which rests on a spring mount. When the correct weight of material is registered, the skip is raised by a power hoist and the aggregate drops into the dryer drum. Here the moisture is removed and the aggregate is brought up to proper mixing temperature.

When the drying cycle is complete, the operator discharges the heated aggregate into the pugmill and adds the proper amount of bitumen. The material is mixed thoroughly and discharged through the bottom of the pugmill. If a truck is in position beneath the machine, the mixed mate-

rial drops directly into it. However, to prevent loss of operating time while waiting for a truck, Reid placed a $1\frac{1}{2}$ -cu. yd. hopper under the pugmill to store the mix.

Any kind of high-type, hot-mix bituminous material can be secured from the range of aggregate materials on hand. To provide the proper gradation when several sizes of aggregates

are required, the proper proportion of each size is placed on a paved area near the plant and bladed into a homogenous state. Tests have shown that this method produces mix meeting very rigid tolerances.

A two-man crew on this adapted Mixall has produced 6 tons per hr. consistently of any of the hot-mix materials carried by the company.

DUMP TRUCK receives a load of hot-mix aggregate from the converted Barber-Greene Mixall on the raised platform. A $1\frac{1}{2}$ -cu. yd. hopper under the pugmill stores excess material.



WELLMAN *Williams Type*

FAST BUCKET OPENING SPEEDS OPERATIONS



- Double-hinge construction on Wellman's multiple-rope bucket permits faster opening than a single hinge. This speeds up operations, also gives a bigger spread in the open bucket for the same headroom.

Wellman's welded-design buckets offer you better performance and longer service. In all types and sizes you'll do better with Wellman!

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Write for free descriptive bulletins.

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CUSTOM-BUILT BUCKETS
STONE AND WOOD GRABS

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7000 Central Avenue • Cleveland 4, Ohio

ARIZONA—Lee Redman Company, Phoenix, Ariz.
CALIFORNIA—Coast Equipment Co., San Francisco, Calif.
OREGON—P. L. Crooks & Co., inc.
Portland, Oregon
WASHINGTON—Construction Equipment Corp.
Spokane, Wash.
Clyde Equipment Company, Seattle, Wash.

News of DISTRIBUTORS

CB&I Salt Lake sales office

Chicago Bridge & Iron Co. announces the opening of a sales office in Salt Lake City, Utah, at 500 West 17th South St. J. Graham Daniels has been transferred from Tulsa, Okla., to head the new branch. This makes the fourth Western CB&I sales office, the others being located at San Francisco, Los Angeles and Seattle.

Blaw-Knox appoints Shaw Sales

Blaw-Knox Co. has appointed Shaw Sales & Service Co. of Los Angeles its exclusive representative in Southern California for Blaw-Knox construction equipment and clamshell buckets, and Foote construction equipment.

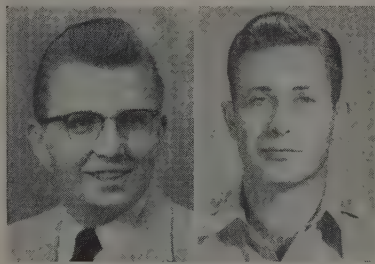
New Westinghouse distributor in Nevada

Appointment of Osborne & Dermody Supply Co., Reno, Nev., as distributor of Westinghouse electrical apparatus in the Reno and Las Vegas Nev., areas is announced by Walter J. Maytham, Pacific Coast regional manager for Westinghouse Electric Corp. The new distributorship is equipped to serve contractors, industries and utilities with Westinghouse electrical equipment. John A. Dermody is president and R. L. Osborne, Jr., is vice president and general manager of the firm, which maintains headquarters in Reno and a branch operation in Las Vegas.

Ziegler names new sales reps.

New sales representatives recently announced by Ziegler Steel Service Corp., Los Angeles, comprise Charles A. Tuchschildt, Phoenix, Ariz., for the State of Arizona; Donald W. Johnson, Portland, Ore., for the State of Oregon and southern Washington;

Paul F. Routon, Wichita, Kans., for Kansas and Missouri; and Sam E. Lee, Dallas, Tex., for Texas and Oklahoma. All are experienced steel salesmen specializing in Ziegler's Steel aircraft and specialty steel commodities.



Milner

Brown

(See item below)

Copco appoints new district mgrs.

Appointment of Howard L. Brown as manager of its Phoenix district office and the transfer of Carlos E. Milner, Jr., to head company operations at Spokane, Wash., is announced by Copco Pacific, Ltd., mining and construction equipment distributors, with headquarters at San Carlos, Calif. Brown was formerly assistant manager of the Arizona-western New Mexico district under Milner. In moving to the Washington office, which also services Idaho and Montana, Milner replaces Anders G. Kindahl, who returned to the parent corporation.

WEMCO in new Denver location

The Industrial Sales Division of Western Machinery Co. in Denver is now occupying new quarters at 2400 West Seventh Ave. The Denver office is sales agent for many lines of mining, industrial and construction machinery in the Rocky Mountain area.

It also acts as distributor for WEMCO ore treatment and materials handling products, and the services of the company's Western-Knapp Engineering Division. A staff of twenty-five is maintained in Denver, headed by Leigh M. Jones, manager. Herbert J. Mayer, WEMCO vice-president and general manager of the Industrial Sales Division, represented the company's San Francisco headquarters at the dedication of the new Denver facilities.

Two moves among Caterpillar personnel

Two changes among Caterpillar's Western personnel involve Russell H. Johnson and Herman G. Eberling. Johnson, who has been a special representative in Caterpillar's Western sales division at San Leandro, Calif., for the past year has been promoted to district representative with headquarters at Portland, Ore. In his new capacity, he will work with Caterpillar dealers in Portland, St. Paul, Albany, Gresham, Hillsboro, Monitor, Wasco and Madras, Ore., and in Yakima and Kennewick, Wash. Eberling becomes a district representative, with headquarters at Phoenix, Ariz. He will work with Caterpillar dealers in Phoenix and Yuma, Ariz., Las Vegas, Nev., and El Centro and Blythe, Calif. He has been associated with the Company's Western and Central sales departments since 1941.

New sales rep for Tubular Products Division

E. T. Wilson, Jr., Portland, Ore., is named sales representative of the Tubular Products Division of The Babcock & Wilcox Co., for the Oregon, Washington, British Columbia, Alberta and Saskatchewan area, as announced recently by James S. Anderson, general sales manager of the division. Prior to his latest appointment, Wilson was purchasing agent for Cascade Manufacturing Co., an affiliate of Electric Steel Foundry and the Hyster Company.

Baker-Lull names San Francisco distributor

Coast Equipment Co., San Francisco, has been appointed distributor for the San Francisco Bay area for Baker-Lull self-contained materials handling equipment, according to G. C. Sturge, president of Baker-Lull Corp.

Fair appointed Pioneer district rep

The appointment of Elton T. Fair as district sales representative was recently announced by Pioneer Engineering Works, Inc. Fair, who is well acquainted with the construction equipment field in his territory, will represent Pioneer in the states of Wyoming and Colorado, the greater part of Montana, as well as parts of

Continued on page 132



NEW service shop and heating plant for Arnold Machinery Co., Inc., at 221 Rio Grande Ave., Salt Lake City. Located just behind the company offices, it is 100 x 40 ft. and includes a steam clean and paint room, two repair stalls, a 10-ton overhead crane and new testing equipment for engines and hydraulic systems.

NEW LITERATURE

Free copies of any of the items
this section may be obtained
using coupon on page 117.

211

Lorain "50" shovels, cranes

A 24-page, 2-color bulletin published by **Thew Shovel Co.**, covers its crawler-mounted power shovels and cranes in the 1-yd. Lorain "50" Series. Design and construction illustrations explain leading features of the equipment. There are also operating views of the Lorain "50" cranes, shovels, hoes, clamshells and draglines, plus sections devoted to each of these five interchangeable front ends with full explanation of their accessory equipment. Form 1558303.

212

Osgood-General line

Bulletin No. 5324 gives a presentation of **Osgood-General's** line of excavating and materials handling machinery. Choice of mountings and front end attachments is illustrated, as well as special equipment for various types of operation. The 4-page information-packed catalog contains condensed specifications of this equipment.

213

162-page brake lining catalog

Johns-Manville is offering the revised 44th edition of the 162-page catalog listing complete specifications, application and ordering data for brake linings for trucks and trailers. Also lists complete line of axles for heavy-duty truck and trailer use. BL-228A-T.

214

Arc welding accessories

Tweco Products Co. has just released a 12-page color catalog covering its complete line of electrode holders, ground clamps, cable connectors and cable accessories for arc welding. Illustrations, specifications and price lists are included. Twecolog No. 9. Send in for a free copy by putting key number on coupon.

215

Gear and tackle manual

An 8-page logging, rigging and land clearing tackle manual issued by **Hyster Co.** illustrates and catalogs the various kinds of gear and tackle used in these operations. Contains drawings and specifications of recommended rigging procedures. Form N. 1168-A.

216

Bulletin on flexible hose

The American Metal Hose Branch of the **American Brass Co.** has published a revised bulletin, TA-177R, on the use of flexible metal hose in handling tar and asphalt. This 4-page

booklet includes pictures of various types of assemblies and fittings, as well as a table of standard sizes and lengths.

217

Free 100-page ephemeris and almanac

The 1954 edition of the **W. & L. E. Gurley Ephemeris** features a new chart of Polaris which makes possible an observation of the star within a minute—and with minimum computation. This 100-page, pocket-sized booklet again includes an almanac (itself an abridgment of the **American Nautical Almanac**) listing 28 selected stars for determining stellar observations. It gives complete instruction for determining azimuths by methods similar to those used in observations of the sun and Polaris. And here are some of its tables abridged from the **American Ephemeris and Nautical Almanac** and the **Standard Field Tables, Bureau of Land Management**: sun's apparent declination and equation of time at 0 hr. Greenwich Civil Time for each day of the year; mean refractions in altitude and declination; semi-diameters and parallax of the sun; upper culmination and elongation of Polaris; azimuth of Polaris at elongation and at all hour angles; logarithms of numbers and functions; natural functions; conversion tables of decimal parts, arc to time, time to arc. The Ephemeris, which also includes a chart of the sun, is available to practicing surveyors and engineers and to instructors and students of surveying.

218

Foundation borer facts

Pertinent information about the **Gar Wood foundation borer** is contained in a new bulletin. Operation of this equipment, which has introduced the unreinforced type of foundation footing, is described. Form F-173 by **Gar Wood Industries, Inc.**

219

On framing hardware

Malleable Iron Fittings Co. has released a brochure covering its transmission line framing hardware. Featured is the grid gain, the basic hard-

ware around which **M.I.F.** framing hardware for round members is designed. Diagrams and photographs show how to make the connection. Each type of connector is illustrated along with brief recommendations for installation. Specification table is included. PH10.

220

Trenching with profit

Cutting costs on trenching jobs solving many tough digging problems and other construction topics are covered in Bulletin 125 Rev. on the **CP Profit Trencher** by **Construction Products Corp.** The 8-page publication has action shots of this machine on various jobs, including loading and dozing when so equipped. Diagrams and specifications are included.

221

Calcium chloride manual

"Calcium Chloride for Stabilization of Bases and Wearing Courses" is a 34-page handbook for the aid of engineers, contractors and others concerned with the use of calcium chloride in highway work. Well illustrated, the manual deals with properties and design, types and methods of construction, and specifications. Manual SM-1 by **Calcium Chloride Institute**.

222

Form 30793

"Cat-Built Pipe Layers at Work" is an 8-page booklet by **Caterpillar Tractor Co.** which illustrates the versatile Cat Pipe Layer mounted on Cat track-type tractors handling heavy objects in various industries.

223

Coupling information

Smith-Blair, Inc., is offering an 8-page booklet giving extensive specifications and price-list tables on its line of flexible cast-iron couplings for cast-iron and cement-asbestos pipe. Includes diagrams. Bulletin 250-2934. Put key number on coupon and send in for a free copy.

224

Covers fiberglass insulations

Owens-Corning Fiberglas Corp. has a new 20-page bulletin on fiberglass insulations for low temperature structures and equipment.

225

Tamper information

Form No. RE-123 by **Road Machinery Division, Wm. Bros Boiler & Mfg. Co.**, explains the advantages of a new type of cleaner teeth on the giant Bros "diamondfoot" tamper.

rollers. Schematic drawings and photos in this 4-page folder show how other design improvements qualify Bros sheepfoot and diamondfoot tamping equipment for a wide variety of job specifications and conditions. Includes specifications table for all models of Bros tamping equipment.

226

Davey information

Davey Compressor Co. has a new illustrated 6-page booklet (Form E) describing the Davey Super Chief 315-500-600 cfm. compressors. Lists complete specifications along with an air requirements table for air tools.

227

340-page Kaiser catalog

Kaiser Steel Corp. has announced its 340-page illustrated general catalog for distribution on a limited basis to Western architects, engineers and manufacturers. In addition to complete information on the company's iron and steel products, the catalog contains 117 pages of general technical information and reference tables. It describes the characteristics, specifications and standard practices for Kaiser's 16 product categories. Steel users will find this publication a valuable reference guide.

228

On Poroswall pipes

The advantages and top features of Poroswall drain pipes are pointed out in a 4-page illustrated brochure telling how to solve drainage problems by use of this product. Table gives standard dimensions and strength requirements. By Poroswall Pipe Division, Walker Cement Products Co.

229

For paving breakers . . .

A bulletin (Form 4126) by Ingersoll-Rand Co. lists its complete line of tools and accessories for paving breakers. After introducing the reader to the various units of the I-R paving breaker line, the bulk of the 12-page bulletin takes up each tool and accessory, each complete with illustration, recommended applications, and a table.

230

Cleaver-Brooks products

The 4-page bulletin Form AD-109 by Cleaver-Brooks Co. covers its complete line of tank car heaters, bituminous boosters, Peak-Temp oil boosters, Deuce-Combination tank car heaters and pumping boosters, and mobile, portable and stationary boilers. Gives illustrations, brief descriptive copy and specifications, and

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ricated ball bearing
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Q
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**UNI-FORM Concrete
Forms?****

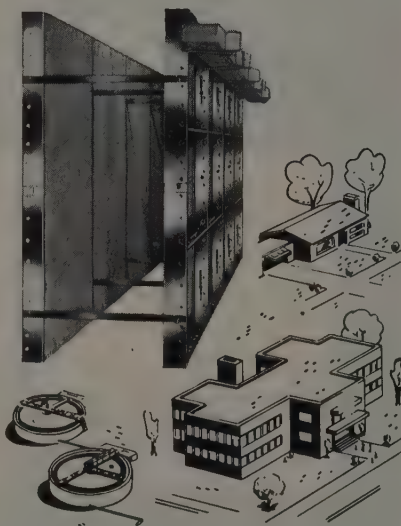
A
Answer:

**No other method of
concrete wall forming
offers so many time,
labor and material
saving advantages**

UNI-FORMING Advantages:

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—forms more contact area per man hour
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- Fast Job starts—ready to use when they're delivered on the job—save time
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...layouts, details, on-the-job assistance for your men

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UNIVERSAL FORM CLAMP CO.	Los Angeles, Calif.

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shows use of these units for such functions as pile driving, aggregate drying, and cold weather construction operations.

Literature briefs . . .

231

CONVEYOR BELTING—Facts about Thermoid conveyor beltings for handling every kind of material on the job are contained in a bulletin offered by Thermoid Western Co. Catalog 3687.

232

FORM B502—How to get top performance on loading operations is covered in this bulletin by Euclid Division, General Motors Corp., on Euclid lever-action scrapers.

233

FOR BETTER MIXING—Find out about the Seaman self-propelled Trav-L-Plant and the self-propelled Pulvimixer. Bulletin TSP by Seaman Motors, Inc., fully describes the mixing method.

234

TOOLS FOR TYING—Catalog 500 by Superior Concrete Accessories, Inc., tells about Superior's continuous threaded coil rods. Includes a table for spacing studs, wales and form ties.

235

TAGLINES—Complete details are available on McCaffrey-Ruddock Corp.'s line of Rud-O-Matic taglines, made in eight models for all bucket sizes.

236

CONCRETE PIPE INFO—Free literature and specifications on all kinds of concrete pipe are being offered by Western Concrete Pipe Association.

237

RUSTMASTER—A 4-page bulletin by General Paint Corp. gives complete information on Rustmaster, a rust-inhibiting coating for new or old steel and iron surfaces. Technical Bulletin 5309.

238

BIGGER BATCHES—Madsen Iron Works, Inc., is offering a free bulletin with complete details on its new 4,000-lb. batch capacity asphalt plant.

239

JOY PRODUCTS—Bulletins by Joy Manufacturing Co. provide details on Joy's portable compressors, paving breakers, sheeting drivers, rock drills, backfill tampers and spaders.

240

PIONEER PRODUCTS—Pioneer Engineering Works has bulletins covering details, specifications and other information on its jaw crushers, roll crushers, rock plants, Oro feeders, apron feeders, mechanical feeders, gravel plants, washing plants, bitu-

minous plants, bituminous pavers, vibrating screens and Continuflo conveyors.

241

CONNECTIONS — Atlas Mineral Products Co. has announced a 20-page booklet describing modern methods and materials for joining sewer pipe.

242

FOUNDATION FACTS — Send in for complete information on Armco Drainage & Metal Products, Inc.'s foundation pipe piling.

243

VOICELESS VALVES — Publication No. 30 is all about Chapman tilting disc check valves and why these valves keep quiet all their working lives. Charts of laboratory test results are featured. By Chapman Valve Manufacturing Co.

244

LOADER BULLETIN — Teale & Co. has published complete information on its hard-working heavy-duty loader for easy attachment to various models of crawler tractors.

245

AIR TOOLS — Le Roi Co. is offering bulletins on its Airmaster line of compressors and Le Roi-Cleveland air tools, an economical and efficient combination for pavement breaking, drilling and tamping.

246

STYLISH SEAL COATS — American Bitumuls & Asphalt Co. is offering free illustrated booklets on its Walk-Top, a cold-applied seal coat in

black, red or green, for various surfaced areas, such as play yards, walks and parking areas, and driveways. A-20 and B-20

247

SMOOTH ROLLING — Huber Manufacturing Co. has published the story of the top performance features of its 8 to 12- and 10 to 14-ton tandem rollers. Bulletin T-152.

248

CONCRETE CURING — Find out about the various kinds of concrete curing compounds manufactured by Hunt Process Co., Inc., which is offering a free illustrated brochure.

249

SCHRAMM BULLETIN — Bulletin AED covers Schramm's line of air compressors for all kinds and sizes of construction requirements.

250

TRACTOR ATTACHMENTS — A catalog and price list is available on Hensley Equipment Co.'s line of tractor attachments, such as rippers, grouser shoes, and heavy-duty rock end bits.

251

WATER WORKS — American Pipe & Construction Co. is offering complete information on its six kinds of reinforced concrete pressure pipe.

252

SCRAPER REPORTS — Here are three brochures describing the use of Crescent scrapers. Field Report 209 tells about the use of this equipment with tractors, and Field Report 219

and Catalog J give information about their use with boom machines. Sauer-man Bros., Inc.

253

LEVELS AND TRANSITS — Union Mercantile Co., Inc., has issued three new booklets presenting photographs and specifications of the Umeco 18-in. dump level, the Umeco 11-in. builder's level and the 5¼-in. survey transit.

254

HYSTER SPEC SHEETS — Hyster Co. has released specification sheets for its D4N oil well servicing winch. Contains complete information, including conversion for seat tank and fender tank-type tractors. Form No. 1182-A.

255

AUSTIN - WESTERN PLANTS — For detailed information about Austin-Western crushing and screening plants send in for the latest catalogs by Construction Equipment Division, Baldwin-Lima-Hamilton Corp.

256

AIR PLUS — For complete information on Jaeger Machine Co.'s "Air Plus" compressors send in for Catalog JC-1.

257

STEEL CASTINGS CATALOG — A general catalog describes the complete line of castings manufactured by American Manganese Steel Division, American Brake Shoe Co. Contains over 100 photographs and detailed information on power shovel dipper, teeth, chain, gears, etc.

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Organization.....

NEW EQUIPMENT

More information on any of the items in this section may be obtained by using coupon on page 117.

258

Clark Equipment Co. adds tractor shovels to its materials-handling line

Six separate models of a tractor shovel or front-end loader, to be marketed in the spring as Michigan tractor shovels, have been announced by Clark Equipment Co. This new line marks a step forward in the manufacture of the firm's materials handling equipment, which includes Michigan power shovels, cranes and draglines as a result of its acquisition of Michigan Power Shovel Co. last May.

The three major types of these new tractor shovels are (1) two-wheel drive with bucket wheel drive and rear wheel steering; (2) two-wheel drive with rear drive wheels and bucket wheel steering, and (3) four-wheel drive with rear wheel steering. The six models will range in capacity from 15 cu. ft. to 2½ cu. yd. Individual models are (1) 12-B, 15-cu. ft. capacity, bucket drive, rear wheel steering; (2) 75-B, 1-cu. yd. capacity, bucket drive, rear wheel steering; (3) 75-R, 1-cu. yd. capacity, rear wheel drive, bucket steering; (4) 75-A, 1-cu. yd. capacity, 4-wheel drive, rear wheel steering; (5) 125-A, 1½-cu. yd. capacity, 4-wheel drive, rear wheel steering, and (6) 175-A, 2¼-cu. yd. capacity, 4-wheel drive, rear wheel steering.

One of the most important approaches to the design of the Michigan tractor shovels has been integration, whereby there is great interchangeability of parts among the various types and models, resulting in lower manufacturing costs and a reduced replacement parts inventory for "fleet" users. Moreover, Clark is manufacturing

almost all component parts. The major components are easily accessible, any one of which may be removed in its entirety without disturbing the others. A new torque converter transmission designed by the manufacturer will be utilized. Steering boosters for easy operation are standard equipment, and the foot-operated conventional clutch has been eliminated and replaced by manual con-

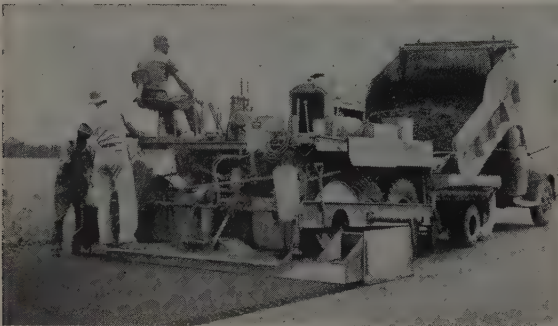


trols on the steering column. A system of planetary reduction on 3.2 to 1 in outer wheel hubs results in low torque load on axles and provides for added safety. Based on rated capacity, each Michigan tractor shovel is reported to be heavier by weight and develops more horsepower than any other comparable equipment.

259

New bituminous paving finisher spreads, levels, and tamps all at once

The rubber-mounted Model PF-90 bituminous paver finisher is reported to spread, level and tamp hot or cold bituminous mix in one continuous operation. These fin-



ishers are also being used successfully in paving pugmill-mixed lean cement mixtures. No forms are required for any of these paving jobs, according to the specifications. The rubber mounting offers sure traction on tricky surfaces and also affords smoother starting and stopping. The longer wheel base and floating-type screed do the job with fewer passes, particularly where there are numerous irregularities in the subgrade. Length is 19 ft., width is

10 ft., and weight is about 20,000 lb. Spreading width is 8 in. to 13 ft. and spreading depth is 0 to 10 in. Eight working speeds range from 18 to 74 ft. per min. Travel speed is 5½ mph. Complete specifications are given in a new free folder. Manufacturer is All Purpose Spreader Co.

260

Osgood-General has new 1-yd. dragline

Model 327, a new 1-yd. dragline, clamshell or 17-ton lifting crane, is now in production at Osgood-General. Among its standard features are roller-bearing mounted hoist drums and hook swing rollers; anti-friction bearings on superstructure main shafts; independent boom hoist, with power up and power down; enclosed deck gears, and machine-cut gear teeth. Optional features are independent travel; torque converters and fluid couplings; rapid folding and back-hitch high gantry; boom stops for safety; different widths of tread belts, and various combinations of boom point sheaves. This manually controlled crawler is 12 ft. 10 in. long; standard width 11 ft. Standard boom is 45 ft. long. For further information send for specification No. 5328.

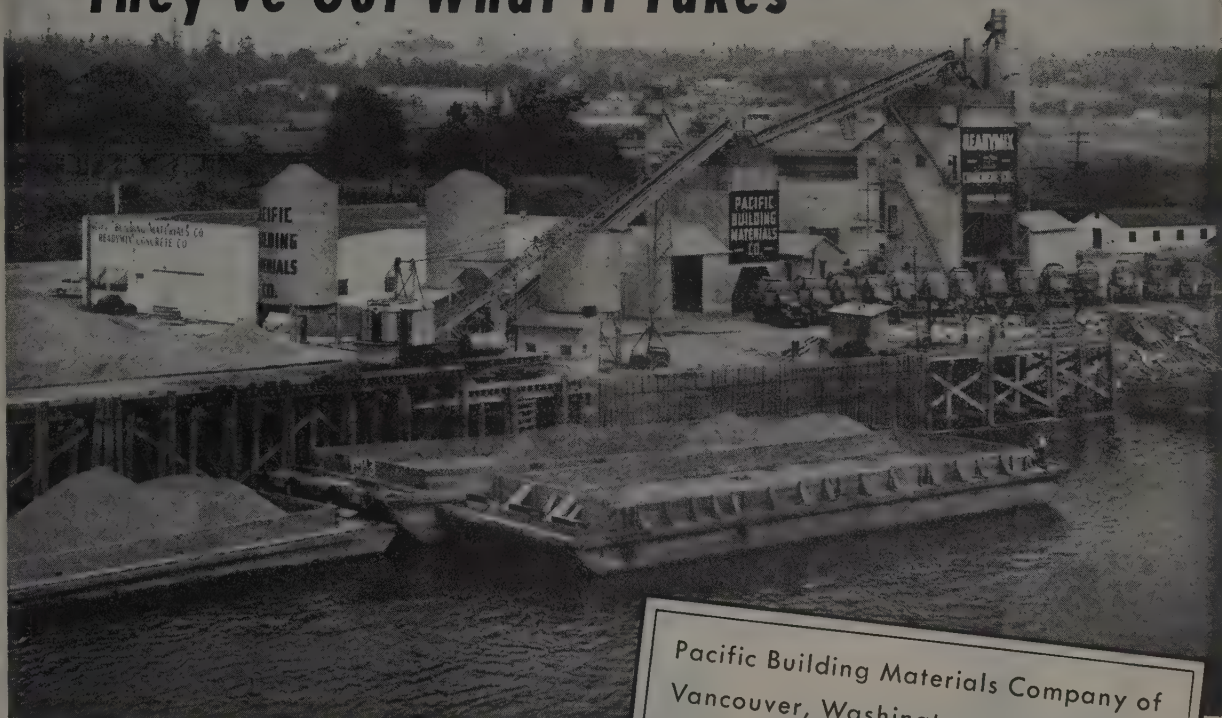
261

Hydrotor simplifies cranking under any condition

A new hydraulic cranking motor designed for use on diesel and gasoline engines is reported to offer efficient, dependable cranking at all temperatures in all climates; higher cranking speed with less bulk weight, and full pro-

NOBLE BATCHING PLANTS

They've Got What It Takes



The batching plant is a NOBLE CA 355, 350 ton, 5 compartment aggregate bin with two 2,000 cu. ft. bulk cement batch silos and a 12 x 7 bucket elevator for cement.

There are five standard sizes of NOBLE Batching Plants for you to choose from in designing a new plant installation or expanding your present facilities.

100 TONS, 150 TONS, 240 TONS, 350 TONS, AND 500 TONS BIN CAPACITY WITH CHOICE OF 1200, 1500, OR 2000 CU. FT. BULK CEMENT SILOS. 12x7 OR 10x6 SIZE BUCKET ELEVATORS FOR BULK CEMENT RECEIVING.

NOBLE Batching Plants, Conveyors and Elevators are by far the best for low cost handling and fast, accurate weigh batching of cement and aggregates for concrete.

Our engineers will be pleased to receive a request from you for advice and cost estimates. There is no obligation.

Pacific Building Materials Company of Vancouver, Washington, report that in over five years of operation they have had "less than 30 minutes of down time," and "repairs to the plant have been negligible, with less than \$100 for repair materials."

Frank Penepaker, owner, and Mel Erland, Vancouver Manager, are happy in the knowledge that they have been able to give their customers prompt service, with more accurately batched concrete, adding up to greater business with more profit.

62

MANUAL, SEMI-AUTOMATIC OR FULL-AUTOMATIC WEIGH BATCHING

DESIGNERS AND BUILDERS

CEMENT AND AGGREGATE BATCHING PLANTS
BULK CEMENT PLANTS • AGGREGATE BINS
CEMENT SILOS • CONVEYORS AND ELEVATORS

NOBLE COMPANY

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February, 1954 — WESTERN CONSTRUCTION

119

tection while operating in hazardous areas. This aluminum and bronze unit, the Hydrotor, may be used with either a recharging or hand pump, and speed may be adjusted as desired. Its distributor, **The Rucker Co.**, is also offering further information about its many advantages for heavy engine equipment.

262

Hydraulic finishing machine increases quality and speed in concrete paving work

The Flex-Plane, the first concrete road building machine to incorporate the benefits of complete hydraulic action, is reported to increase both quality and speed in concrete paving operations. In addition, it is completely portable, has fast width adjustment, and is simple and easy to operate. Two models are available. One adjusts to 10- to 15-ft. widths and weighs about 9,500 lb.; the other is adjustable to 20 to 25 ft. and weighs about 11,500 lb. Two 12-in. wide hydraulically reciprocated screeds work at from 0 to 100 strokes per min. The finishing machine's working speed is up to 24 ft. per min.; its travel



speed is as fast as 220 ft. per min. And all of these speeds are infinitely adjustable. Track wheels are available to meet various specifications. With screeds hydraulically raised overhead, the Flex-Plane measures less than the 8-ft. maximum width permitted for road travel. Manufacturer is **Flexible Road Joint Machine Co.**

HENSLEY EQUIPMENT SAVES THE ORIGINAL COST . . .

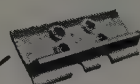
*When the going is **TOUGH!***



LIGHTWEIGHT, HEAVY DUTY RIPPER. Fits all small, medium and large dozers. Penetration 8" to 18". Excellent tool where grade has been lost and for corner cuts.



REMOVABLE DOZER RIPPERS. When used in sets of three to five units they give you coverage the width of blade for ripping concrete, hardpan, blacktop, red rock and other hard surfaces.



D-7, D-8, TD-24 HEAVY DUTY GROUSER SHOES. Bar engineered to wear evenly with minimum loss of traction and flotation.



D-7 AND D-8 BOTTOM TRACK ROLLERS and roller parts—machined to fit track rail and give maximum value in traction.



HEAVY DUTY ROCK END BITS for D-6, D-7 and D-8 dozers. Designed for lasting wear and penetration.

INCREASE YOUR TRACTOR'S WORKING POWER

...With These and Other Items Available at Your Hensley Equipment Dealer: Dozer brush rakes, scraper rippers, scarifier shanks and teeth, overlay end bits, hitch blocks, D-8 water pump shafts and impellers. From the moment you equip your rig with Hensley—you begin to **SAVE!**

There's a Hensley Equipment Dealer Near You

ARIZONA

Hollenbeck Equipment Company, Phoenix.

CALIFORNIA

Hensley Factory, Oakland. Hensley Branches: Sacramento (Eldon Wible); Grass Valley (Frank Rowe)

COLORADO

Gossman Scraper Works, Monte Vista; S & M Supply Company, Grand Junction; Joe Smith Machinery, Denver.

MONTANA

Seltz Machinery Co., Billings and Great Falls; Treasure State Equipment Co., Kalispell and Missoula.

NEVADA

Elko Blacksmith Shop, Elko.

NEW MEXICO

Lively Equipment Co., Albuquerque.

OREGON

Fowler Engr. Sales, Ashland; Western Equipment Company, Eugene and Portland.

TEXAS

Lively Equipment Co., El Paso.

WASHINGTON

Western Tractor & Equip. Co., Chehalis, Seattle and Tacoma.

WYOMING

Wilson Equip. & Supply Co., Casper and Cheyenne.

ALASKA

Western Tractor & Equip. Co. (Philpott Equip Co.), Anchorage and Fairbanks.

HENSLEY EQUIPMENT COMPANY

816 - 98th Avenue
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Please send me free catalog and price list and the name of the nearest Hensley dealer!

Name.....

Company.....

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City..... Zone..... State.....



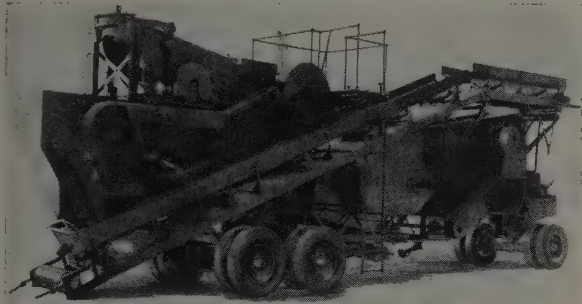
HENSLEY EQUIPMENT COMPANY

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Write for the name of your nearest HENSLEY Dealer.

Portable gravel plant ends big boulder bugaboos

A large 18 x 30-in. primary jaw crusher and a 30 x 18-in. triple roll secondary crushing unit permitting almost simultaneous passes at the rock or gravel are what make the Model 33G Triplex portable gravel plant especially



good in areas where pits contain a lot of boulders. The contractor has no need to move in an additional "rock plant" to handle the larger material. The plant's other basic units are a single-deck, plate scalping screen; a 1½-deck secondary vibrating screen; hopper; mechanical feeder, and necessary conveyors. All major units are mounted on a single chassis permitting rapid and frequent moves from one gravel pit to another. Total weight of the plant (less power unit) is about 71,000 lb. Travel dimensions are: length, 43 ft.; width, 9 ft., 8 in.; height, 12 ft., 6 in. Bulletin 646 is available by mailing in coupon. Manufacturer is Pioneer Engineering Works.

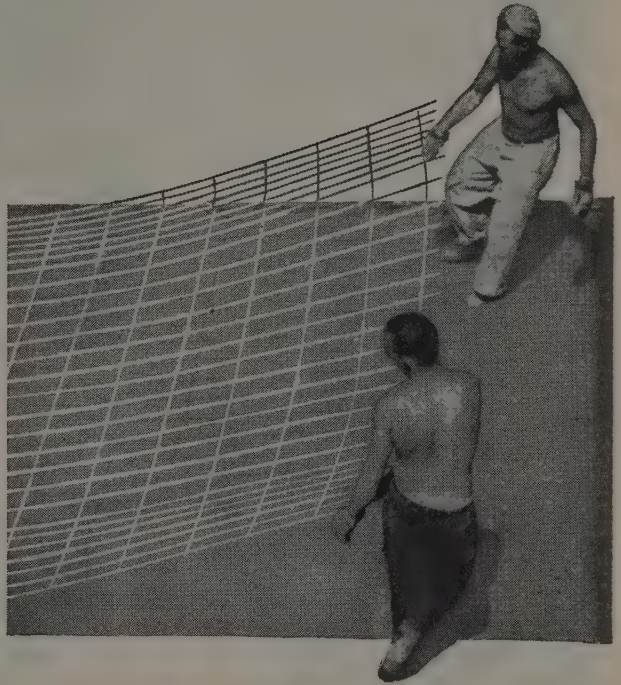
Versatile Type WB excavator and crane speeds up production

The new Type WB excavator and crane, adaptable to shovel, hoe, hookwork, dragline, clamshell, logging, pile driving and magnet operation, has been developed as a result of a demand for certain job requirements in a ma-



chine of that type. Here is a resumé of just what Type WB can do for contractors: It can feed a 3-compartment batch bin normally requiring the use of two ¾-yd. machines; for bridge builders it can handle a 17,000-lb. hammer and a third drum accommodating 200 ft. of ½-in. cable; for

FOR HIGHWAY CONSTRUCTION...



CLINTON WELDED WIRE FABRIC

Concrete pavements and concrete base courses for asphalt and brick surfaces are best reinforced with welded wire fabric. Clinton Welded Wire Fabric is available in a wide variety of wire gauges and spacings for all heavy reinforcing requirements. Clinton Fabric meets all A.S.T.M. specifications.

THE COLORADO FUEL AND IRON CORPORATION—Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION—New York, New York

2006.

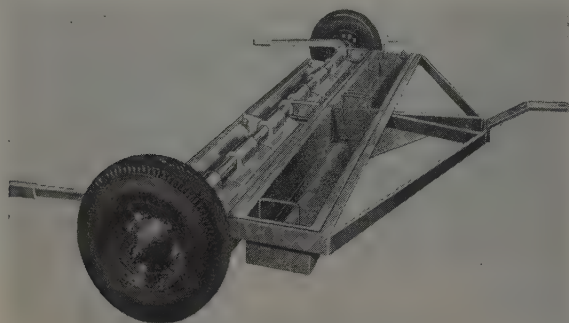


quarry or pit operations it can produce more results than two $\frac{3}{4}$ -yd. shovels. The backhoe can dig 24 ft. below the surface; the crawler crane can handle at least a 100-ft. boom, and the dragline can handle a 1-yd. bucket on a 60-ft. boom. Some of the Type WB's operating and mechanical features are as follows: power lowering on the main load line, independent travel, multiple travel speeds, independent third and fourth drums, high folding power-operated gantry, and easily removable crawler frames. Crawler, truck and self-propelled rubber-tired (carrier) mounting is available as required. Complete information may be had by sending for Catalog No. 192. Manufacturer is Insley Manufacturing Corp.

265

Magnetic road sweeper cuts down-time and increases production

Getting all kinds of tire-hungry tramp metal off roads, loading areas, and airport pavement is simplified by use of the new Homer magnetic road sweeper. These self-



contained units cost nothing to operate, requiring no electric power source, and are safe to operate in any atmospheric condition. Each model has a built-in receptacle into which the tramp metal is stored until the end of the sweep. They are also furnished with a trailer hitch. Available in 4 sizes, with effective sweep widths of 48, 60, 72, and 96 in. Manufacturer is Homer Manufacturing Co.

266

Two new open bowl Terra Cobra scrapers have 15- and 13.5-cu. yd. capacities

Wooldridge Manufacturing Co. has added two new models to its line of Terra Cobra scrapers. Model TH-090B has a heaped capacity of 15 cu. yd. and a struck



capacity of 12.2 cu. yd. Model TH-090 has capacities of 13.5 cu. yd. heaped and 10.2 cu. yd. struck. The larger model is powered by a 180-hp. Cummins diesel engine and the smaller by a 165-hp. Cummins. Basic design characteristics include the new open bowl design, positive hy-

draulic steering, an air-actuated direct-connected power control unit, "boiling bowl" loading system, positive "Roll-Out" ejector, and 11-in. base diameter vertical oscillating king pin coupling between scraper and tractor units. These rugged units feature high ground clearance, wide apron opening, short turning radius, low center of gravity, and high degree of stability in all turning positions.

267

Largest Cedarapids bituminous plant produces 5,000 to 6,500 lb. per batch

Iowa Manufacturing Co. has redesigned its Model E type plant with 50% greater capacity into the new Model G-60, now the largest bituminous mixing plant in the



Cedarapids line. Its 65-cu. ft. aggregate batcher and 60-cu. ft. mixing unit permit capacities ranging from 5,000 to 6,500 lb. per batch. The Model G-60 may be operated manually or semi-automatically with full pneumatic controls, or batching and control equipment may be completely automatic and controlled electronically (optional). Its closely controlled batching gives the versatility which enables the contractor to change the type of specification mix with practically no delay.

The base unit of the G-60 consists of the tower structure, totally enclosed hot elevator, a Cedarapids Model S 48-in. x 14-ft. double-deck horizontal vibrating screen enclosed in sheet metal dust housing, a 29-cu. yd., 4-compartment storage bin with overflow chute from each compartment and reject chute for oversize material, the mixer, the aggregate batcher, bitumen batcher, bitumen pump unit, and complete pneumatic controls with compressor. Further details and specifications are available.

268

Spreader features independent control of spread width and density of material

The new 1954 model hydraulically driven Hi-Way Model E sand, cinder, salt and chloride spreader is available for ice control, seal coat and dust control work. One hydraulic motor controls conveyor drag chain, while a second gives completely independent control of the spreading disc. Thus in any gear or in any speed the operator can spread whatever density of material he wants in whatever desired width up to 80 ft. All operations are cab-controlled by single operator. The new spreader is also available with one hydraulic engine to drive both the conveyor and the spreading disc. Manufacturer is Highway Equipment Co., Inc.

Announcing the new, 1954 line of **DAVEY AIR TOOLS***



NEW

BACKFILL TAMPERS

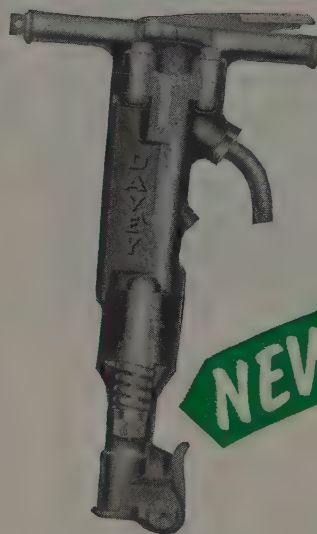
2 sizes—32 lbs.
and 45 lbs.



NEW

ROCK DRILLS

4 sizes—28 lbs. to 58 lbs.



NEW

PAVING BREAKERS

4 sizes—35 to 90 lbs.

Streamlined... perfectly balanced... easier to handle... hard-hitting with extra high penetrating power!

That's the perfect description of the new Davey "big production" air tools for '54.

Designed with many exclusive features, they're truly modern tools built to meet modern high speed needs. Workmanship, of course, conforms to traditional Davey standards—nothing could be finer!

These new tools will boost your daily output, cut costs... win enthusiastic approval of every worker. And, because they offer the greatest parts interchangeability ever available in any tool line, they greatly reduce maintenance and repair expense.

For complete details, see your nearest Davey distributor. He'll be glad to tell you how your compressed air can "do more in '54".

A-8611

* Illustrations show typical tools.

DAVEY

*pioneers of
"air-cooled air"*

DAVEY COMPRESSOR CO. • KENT, OHIO

267

Kenworth truck features new cab-beside-engine design

Starting with the aim to achieve maximum driver visibility, Kenworth Motor Truck Corp. engineers have designed a new type of truck which incorporates a revolutionary cab-be-



side-engine design. For example, the driver of this CBE truck can see the head of a man standing in any position next to the cab. Other advantages cited are reduced weight, largely the result of all-aluminum welded construction; simplicity of design; added strength; easier access to the engine; lower maintenance and repair costs, and more comfortable riding. Cab vibration is considerably reduced, engine noise in the cab is greatly eliminated, simplified exhaust system is detached from the cab; these and many other features help to reduce driver fatigue. Over-all dimensions are 70 in. long and 96 in. wide. The CBE model is also available with a sleeper cab.

270

Cyclone dust collector is efficient, portable

The new Standard Twin 92-in. portable cyclone dust collector is reported to offer peak efficiency in dust collection and in portability for 3,000-, 4,000- or 5,000-lb. asphalt plants. Mounted on its own gooseneck trailer-type frame, it is available with or without running gear. It is especially designed for use with standard truck-size tires, thus permitting interchange with other equipment. Operated with either diesel engine or electric motor

drive, the new unit is complete with large exhaust fan, dust return screw and fan stack with louver damper for maximum dust control. Meets all known state highway clearances. Manufacturer is Standard Steel Corp.

271

Improved molded pipe fittings

Pee Vee Cee fittings, reported to be more uniform, stronger and more economical than previously available transfer molded fittings, have been announced by Thermoplastic Structures Division, Atlas Mineral Products Co. They are injection molded fittings of rigid polyvinyl chloride threaded pipe in sizes ranging from 1/2 in. to 2 in. O.D.

272

Heavy-duty saw cuts timbers up to 16 x 16 in.

An extra-heavy-duty power saw, the new Consolidated Comet Model TC 16 Timber Cutter, has been designed for cutting up to 16 x 16-in. timbers, both cross cutting and mitering up to 45 deg. It is mounted on a structural steel table frame with heavy pressed steel legs and features a built-in roller type cutting table. It is powered by a totally enclosed, fan-cooled, 50/60-cycle, 3-phase, 1,200-rpm., heavy continuous duty motor, has a magnetic starter and remote control station convenient to the operator, and a chain feed mechanism which assures accurate, quick and effortless cutting. Manufacturer is Consolidated Machinery & Supply Co., Ltd.

273

New line of hoists designed for 12- to 24-ft. dump bodies

Four models of telescopic hoists are available for 12- to 24-ft. dump bodies for trailers or tandem trucks. These include single-acting units with either twin 7- or 8-in. cylinders and 80-in. stroke, and single acting units with 7- or 8-in. cylinders and 54-in. stroke. They feature cylinders mounted with pin-eye end connections for free swinging action. Manufacturer is Perfection Steel Body Co.

274

Two 3/4-cu. yd. power shovels added to Michigan line

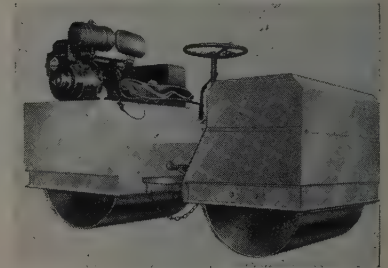
First new addition to the Michigan power shovel line since acquisition of the Michigan Power Shovel Co. by Clark Equipment Co. is a 3/4-cu. yd.

power shovel. This 3/4-cu. yd. equipment, largest capacity Michigan model to date, will be manufactured in two models. Model C-24 will be a crawler-excavator, and Model T-24 will be a truck crane with either 6 x 4 or 6 x 6 all-wheel drive with optional power steering. A new feature for the truck-mounted model is a large-capacity compartment for hooks, fall blocks and other equipment. Transmissions and power take-offs will also be manufactured by Clark Equipment Co. A modern design cab affords full visibility for the driver, and all shaft and drum clutch controls are air ram-operated, conveniently grouped for ease of operation.

275

One-ton Motoroller effects 56-lb. per sq. in. compaction

A newly designed one-ton Motoroller has been designed to answer the demand for a heavier roller incorporating the features of the 1/2-ton Motoroller, a general utility unit for



small bituminous jobs in confined areas. The new model, which will be on the market in the Spring, effects 56-lb. per sq. in. compaction. Special emphasis is on maneuverability as well as ease of transportation from job to job. Some of its features are: a newly-designed center poise hook-up which insures perfect tracking of the front and rear rolls; geared steering; low center of gravity for working on grades and slopes, and compact frame structure. Manufacturer is Gabb Special Products.

276

Plaster and mortar mixer for small contracting jobs

Good news for either the small contracting firm or the larger organization with need for auxiliary equipment is the announcement of a low-priced (\$180 f.o.b.) plaster and mortar mixer of 2-cu. ft. capacity. Weighing only 195 lb. complete, it is built along

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Highway Frames and Grates
Drop Balls - Pavement Breakers
Bridge Rockers & Expansion Plates

the same lines as the manufacturer's larger models. Equipped with either a 1.7-hp. Briggs & Stratton air-cooled engine or a ½-hp. electric motor, 110 volts, single phase. Manufacturer is Muller Machinery Co., Inc.

277

Portable drawing board available for precision work

Engineers, draftsmen, contractors and others requiring a precision drawing, sketch or design will be interested in this portable drawing board molded of clear polystyrene plastic. Weighing less than 8 oz., it measures 9¾ x 12¼ in. Four corner clamps keep your



paper secure. Two metal straight edges, one horizontal and the other vertical, are retractable, thus making it possible to do precision work without the use of a T-square. It is also useful for tracing or shadow box work. Manufacturer is Graphostat Co.

278

New line of steel scaffolding

A new line of low-cost all-steel scaffolding goes up faster and knocks down quicker because it has no wing nuts to tighten, and no patent clamps to adjust. It contains built-in work stands at every working level and is completely adjustable to any height. Manufacturer is Superior Scaffold Co.

279

Roller features flanged hauling yoke

A new flanged hauling yoke on Southwest's compaction roller permits changing the draft beam to match the Caterpillar DW-21 and/or other standard wheel or track-type tractors. The unit's four weight boxes may be filled with any material to attain a single tire load of as high as 53,000 lb. Each of these boxes rides on its own wheel and tire. They are hinged at the rear to oscillate independently up and down at a distance of 12 in. Manufacturer is Southwest Welding & Manufacturing Co.

280

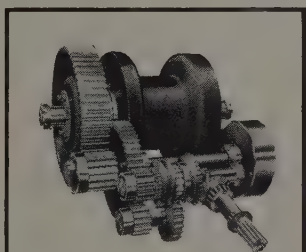
Shaker conveyors are ideal for hot and abrasive material

Reinforced metal troughing which is both heat and abrasion resistant make this line of shaker conveyors



An equipment lesson from the Alcan project

... 61 CARCO winches needed on the job

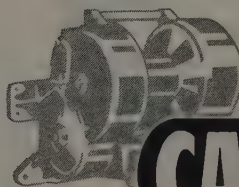


Doubling the pulling power of the most powerful crawler tractors calls for a gear train that's tough and rugged. The Carco Model J winch converts tractor power into line pull efficiently and directly through a 4-stage, constant mesh gear train. The doubled line pull is made possible by a high ratio of gear reduction. As faster line speed is generally desired for paying out the line, a lower gear ratio is provided in reverse. Heavy-duty gears and shafts of heat-treated special alloy steel guarantee a large overload capacity. Precision cut, gears and shafts, with anti-friction bearings, operate in a continuous oil bath. Rugged simplicity and fewer parts make Carco winches more dependable and easier to service.

Probably the most versatile equipment on the Alcan project in British Columbia are powerful crawler tractors equipped with dozers and Carco winches. So useful has this "team" proven that 61 Carco winches and hoists have been purchased for this job... the largest number of tractor winches ever known to be used on a construction project.

Pictured is a Carco Model J winch on an International TD24 using tractor's own power to pull this heavy crawler up a steep hillside so it could doze access road down hill.

Powerful, mobile Carco winches double tractor pulling power and increase tractor "reach" . . . they will earn their way for towing, hoisting, loading as well as for emergency rescue equipment. Remember, you can expect greater value from the leading producer, and get it from Carco, first in winch production. PACIFIC CAR AND FOUNDRY COMPANY, Renton, Washington. Branches at Portland, Ore., and Franklin Park, Ill.



WINCHES FOR ALL
INDUSTRIAL TRACTORS

CARCO

adaptable for handling many materials, including rock, sand, dirt, coal, refuse and ore. The conveyors move materials for distances up to 500 ft. Several materials can be transported separately, with the feed and discharge arranged at various points along the trough. Normal capacity is 100 tons per hr. Though constructed for heavy-duty service, they are lightweight, portable and quickly assembled. Manufacturer is **Goodman Manufacturing Co.**

281

Self-locking device for "Trouble-Saver" scaffolds

A device for speeding erection and dismantling of the "Trouble-Saver" sectional steel scaffolds has been announced by **Patent Scaffolding Co., Inc.** Designated the "SideLok," this self-locking unit is used to fasten diagonal cross braces to scaffolding frames. Bulletin PSS-32 is available.

282

Torque converter boosts Payloader performance

A 3-element type hydraulic torque converter which multiplies the torque output of the engine in direct proportion to the load requirements is added to the Model HM Payloader tractor-shovel. It reduces the amount of gear-shifting and clutching necessary, acts as cushion for the power

train, reduces maintenance and prolongs the life of the unit. Manufacturer is **Frank G. Hough Co.**

283

Fork lift is convertible to loader, dozer, or tractor

A versatile 3,000-lb. capacity fork lift, the Terra-Lift M3, can be converted within 10 min. to a $\frac{3}{4}$ -yd. bucket



et loader, a 6-ft. angling dozer, or a towing tractor of 30-drawbar hp. Equipped with hard rubber shoes and for use either indoors or outdoors, the Terra-Lift will handle materials in deep mud, sand or snow, oil-soaked floors, and is even able to achieve ex-

cellent traction on glaring ice. It is available with a 9- or 12-ft. lifting mast and can handle gravel, sand, steel, pilasters, brick or cement blocks from unpaved work areas to second story height. Has only 6 psi. of ground pressure under full load, and comes completely equipped with forks, loader, angledozer and tow hooks. Manufacturer is **American Tractor Corp.**

284

Power take-off featured on Challenge 3- to $3\frac{1}{2}$ -yd. mixers

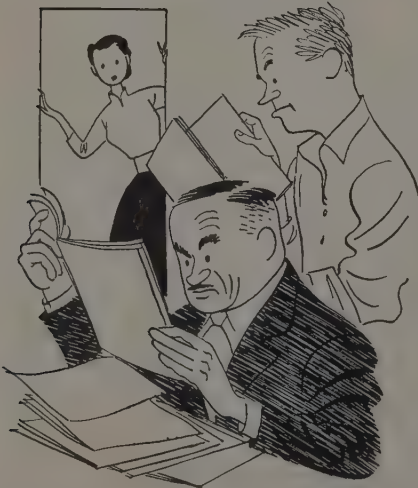
Challenge truck mixers are now available with power take-off on the 3- and $3\frac{1}{2}$ -yd. sizes. This feature permits full, legal-rated payload capacity on shorter wheelbase on standard or on cab-over-engine trucks. The power take-off has a high and low gear which permits a wide range of operating and discharge speeds, and makes the unit easily maneuverable in close quarters. Manufacturer is **Cook Bros. Equipment Co.**

285

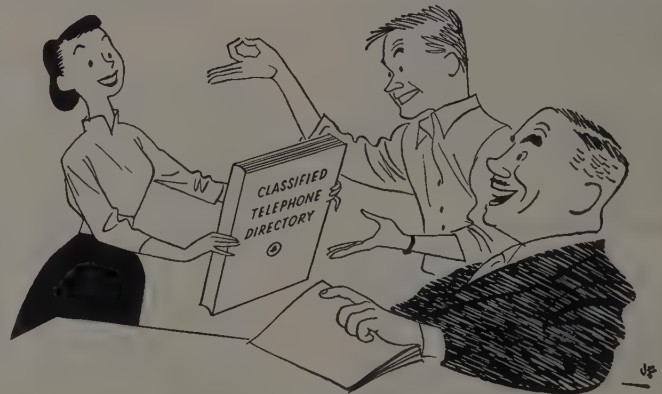
Non-adjustable, direct pressure clutch introduced

A heavy-duty, non-adjustable, direct pressure clutch features rugged structure and broader interchangeability with other direct pressure clutches in the field, combined with high torque capacities, minimum parts, low release loads, and positive

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engagement. Both single and double plate sizes of the new clutch are contemplated. These sizes will supply ample torque capacities for engines developing 200 to 1,400 ft. lb. of torque. Manufacturer is Lipe-Rollway Corp.

286

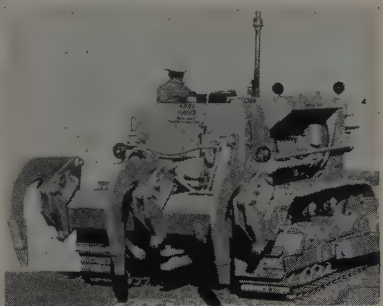
Remote weight indicator for safe crane operation

For the safe operation of boom cranes, bridge cranes and overhead hoists having capacities up to 200,000 lb., **Martin-Decker Corp.** is offering its Type S-12 remote indicating crane weight indicator. The large 12-in. indicating dial is installed directly in front of the operator. It is always ready to use because there is no need for other methods of finding the weight of the load. Type S-12 has a guaranteed accuracy of 1% of the maximum dial reading.

287

Heavy-duty rock ripper for Cat D8's is now available

A hydraulically - operated, heavy - duty, tractor-mounted rock ripper for Caterpillar D8 and D8 pusher crawler



tractors is capable of ripping 18, 24 and 30 in. deep with 9-in. head frame clearance. A 3-position pin spacing on standards permits selection of desired maximum ripping depth. Design of drawbar mounting confines pulling loads to the drawbar rather than to the transmission case, leaves track frames clear for dozer installation. Ripper standards are curved and tapered for easier penetration and are scientifically contoured to provide added strength at points of maximum strain. Average section is 3½ x 10 in., and weight is about 500 lb. each. Net weight of unit is about 8,000 lb. Manufacturer is **American Tractor Equipment Corp.**

288

Submersible sump pump has 2,200-gal. per hr. capacity

Designed for portable or stationary service, a new automatic electric submersible sump pump with 1¼-in. discharge has a capacity of 2,200 gal. per hr. at a discharge head of 10 ft. or a 400-gal. per hr. capacity at a 24-ft. head. It operates on continuous or intermittent duty and features positive

NEW CONDENSED HANDBOOK

for faster concrete handling and placing...

THE NEWEST METHODS for handling and placing concrete are condensed into this 56-page, pocket-sized booklet. It covers all phases of construction methods. Lists available current technical data...includes useful tables...illustrates correct and incorrect methods...shows unusual jobs and how they were solved...and many other important facts.

This manual also has equipment references and complete check lists of job specs, job conditions and equipment.

It's the kind of book any concrete man can use every working day; ask for your copy at your Gar-Bro dealer's... or write today !

THE WORLD'S MOST COMPLETE LINE OF CONCRETE HANDLING EQUIPMENT

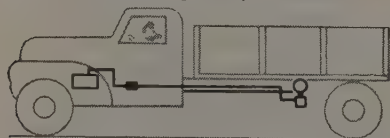
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McDonald REVERSALARM

keeps the road clear
—BEHIND!



To protect workers in the path of backing-up trucks, equip your rolling stock with McDonald Reversalarm! Its powerful gong automatically sounds with unmistakable authority within the truck's first 8 inches of backward motion. Completely automatic — works even without truck motor running! Sturdy, weatherproof Reversalarm lasts for years — pays for itself many times over by preventing costly accidents.



Installing Reversalarm is easy. Its automatic interrupter switch connects to transmission speedometer cable take-off. Operates on 6- or 12-V systems.

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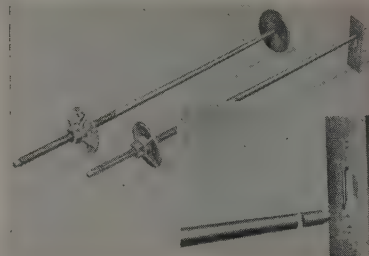
Other Offices in San Francisco and Houston

priming without venting. The $\frac{1}{3}$ -hp. motor is specifically designed for submergence duty. Pump down range is up to 18 in. with no complicated adjustment required. This compact equipment is only $12\frac{1}{2}$ in. high and weighs 40 lb. Manufacturer is Penberthy Injector Co.

289

Concrete form clamp insures quick make-up, fast stripping

Only a light tap with a single jack hammer makes it possible to drive the new Tape Type form clamps. Formerly threaded on both ends for attaching washers, these clamps, which fea-



ture a tapered rod, utilize a fast-assembling keyplate on the small end instead of a threaded washer. Keyplate construction eliminates make-up, insures fast stripping after the concrete is poured, and eliminates all re-make-up time. Type A, with washers, is adjustable for 6- to 14-in. concrete and may be used in conjunction with she-bolts for even greater extensions. Type B, employing the new keyplate is adjustable for 6- to 13-in. concrete. Manufacturer is H. J. Krueper Co.

290

Safety device for bucket elevators, conveyors

The S-A enclosed roller-type Hold-Back is designed to prevent reversal of bucket elevators and inclined conveyors due to power failure under load. This device mounts directly on the drive shaft, with the torque arm bolted to a support with sufficient strength to resist the load exerted when reversal occurs. Maximum torque resistance ranges up to 350,000 lb. for units with a maximum bore of 7 in. Manufacturer is Stephens-Adamson Manufacturing Co. Bulletin 444X is available.

291

Style, strength and power on 1954 GMC truck line

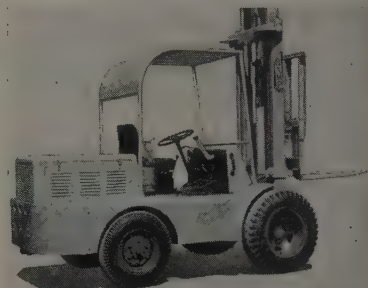
A brand new emphasis on beauty for utilitarian purpose will open the eyes of interested truck buyers for GMC's 1954 line, which offers a choice of 12 brilliant new colors and six color combinations. On the 470-30 series, which handle gross combination weights up to 45,000 lb., a new transmission successfully teams 4-speed truck-type Hydra-Matic with a new GMC 2-speed auxiliary gear box. A

new series of shortened cab-over-engine highway tractors giving operators maximum load opportunities under various state over-all length laws was also announced. Heavy-duty models thus affected are F630-42, DF660-47, and F660-50 (four wheelers), and FW620-42 and DFW620-47 (new six-wheelers). A 248-cu. in. GMC engine is standard on all models 100 through 250, and a 125-hp. engine is featured in the light GMC's, highest 6-cylinder horsepower rating in the industry for this class. This new line also features a Silent Power muffler to take care of objectional exhaust noises. Manufacturer is General Motors Corp.

292

Two new Champ lift trucks

The Champ "700," powered by a 100-hp. International engine, and the "600," powered by a new Chrysler industrial model 16 engine, are ready for fast and rugged service in the ma-



terials handling equipment field. They feature finger-tip control, power steering, power brakes, maximum road clearance, greater maneuverability in close quarters, and strong construction. Lift masts are from 14 to 20 ft. on the "700" and from 8 to 20 ft. on the "600." Manufacturer is Champ Corp. Complete specifications and performance records are available.

293

Reflector lamps have various applications

Rated for an average life of 2,000 hr., narrow and wide beam 300-watt reflector lamps with a Par-56 bulb shape have been announced by Westinghouse Electric Corp. Featuring a powerful and accurately controlled beam, these new lamps may be used at 115, 120 or 125 volts and may be burned in any position. Should be protected from the weather when used on outdoor construction jobs.

294

Remote-reading tank gauge announced

The Keco remote-reading tank gauge shows the depth of fuel in inches to a depth of 9 ft. It may be used wherever quick gauging is desired without going near the tank. The $8\frac{1}{2}$ -in. high etched-aluminum scale plate has 4 different scales to

permit using the gauge with fuels of a wide range of API gravities. Only one scale is visible at any time. If the grade of fuel is changed, the scale plate is readily turned to bring the proper scale into reading position. It works as a frictionless hydrostatic balance, and has no moving mechanical parts except a small air pump built into the case. Installation consists only of mounting a 1/2-in. pipe in the tank, placing the instrument on a wall or column, and connecting a 1/2-in. copper tube from the tank to the gauge. Manufacturer is **King Engineering Corp.** Bulletin 375 gives full details.

295

Unit for instant control of sandblast operations

A new Recova remote control dead-man valve for all types of sandblast machines provides instant control of blasting and nozzle head, reduces manpower and material costs, and insures complete safety for the workmen. Blasting is started or stopped by depressing or releasing the hand valve. Resulting pressure drop opens bleed-off valve in less than 2 sec., completely releasing all pressure. Air intake valve, through which pot is charged, is simultaneously closed in order that no pressure may enter. Should an accident cause operator to drop the nozzle, machine instantly

stops. Manufacturer is **Clementina, Ltd.**

296

New type connector for joining wood

Tu-Bolt, a new kind of connector for joining wood, is reported to be the first known fundamental improve-



ment of the conventional threaded bolt. Essentially it is a tube inserted in a bolt hole and flared compressively at both ends. This new connecting system was first used (with washers) in construction of the McNear Park grandstand at Petaluma, Calif. Its present development is directed to the fabrication (without washers) of loading pallets subject to abuse. For the latter application a 30-ton hy-

draulic press installs 16 Tu-Bolts at once in any pattern within a 5-in. strip and over a span of 48 in. This important new fastening system is a custom service. Send in for more information. Manufacturer is **Tu-Bolt.**

297

Circular base cuts weight, size of gas vibrator

Viber Company is now offering its standard gas vibrator with a strong, light, circular pedestal base to provide maximum compactness and lightest weight. It saves 14 lb. in weight and 10 in. in overall length compared to the standard 2-wheel carriage mounting. This 24-in. diameter base, made from all-welded standard 1-in. pipe is easily interchangeable with Viber's standard carriage mounting. The complete model with the new circular base is Model GC.

298

New 1-cu. yd. front end loader with torque converter

Pettibone-Mulliken Corp. has added a 1-cu. yd. front end loader with torque converter to its Speedall front end loader line. This new model incorporates the same high dump and long reach of the 1 1/2-cu. yd. Model 15 Series Speedall, which together with the torque converter, provides power transmission of extra yardage, higher daily output, faster cycles, less break-



It's Barnes Again On Another Tough One!

Two Barnes 90M Self-Priming Centrifugal Pumps are doing an outstanding job of controlling the water level in the gypsum quarry of the Celotex Corporation at Port Clinton, Ohio. No tougher job could be given any pump. Discharge lines running straight up for 100 ft., then taking off at an angle for 20 ft. more; water high in sulphur content and laden with grit and silt. These Barnes pumps are on the job day in and day out—one for 7 years the other for 3 years. Only maintenance was to shim impeller of one pump to bring it to recommended clearance. If Barnes is tops on tough jobs—what a buy they are for your dewatering job.

Barnes Self-Priming Centrifugal Pumps range from 1-in. to 6-in. suction and discharge sizes; capacities from 2,000 to 90,000 G.P.H. and choice of Gasoline, Diesel, Electric or Pulley Drives.

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Lee & Thayer Equipment Co., Los Angeles, Calif.
H. W. Moore Equipment Co., Denver, Colorado
The Rix Company, Inc., San Francisco, Calif.
Universal Equipment Company, Seattle, Wash.

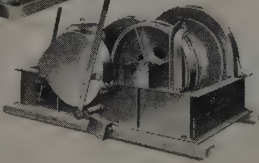
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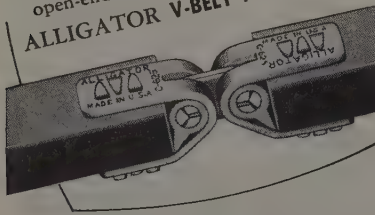
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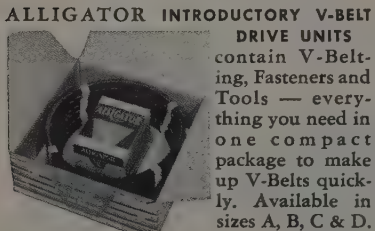
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299

Rock dipper has a streamlined cutting edge

A new "hopper type" rock dipper incorporates the use of a streamlined cutting edge with integral tooth horns to take solid manganese or alloy steel



teeth or alloy steel 2-piece teeth. The front is designed with heavy rugged sections at maximum wear points. An Esco patented wedge-type door and latch mechanism cuts out shock and slamming. The rock dipper is designed for use on a Northwest 80-D machine and weighs about 5,300 lb. Manufacturer is Electric Steel Foundry Co.

81

Lightweight diesel power package develops 76-brake hp.

A new valveless diesel power package developing 76-brake hp. at 2,500 rpm. and weighing only 1,450 lb. is recommended for use in rock crushers, small shovels, air compressors, pumps and other construction equipment needing adequate power in a compact package. The unit is of 2-cycle design with a Roots-type blower forcing fresh air into and exhaust gases out of the cylinders. It has automotive type electrical push-button starting. Length is 54-in., width 28 in., and height 48 in. Manufacturer is Detroit Diesel Engine Division, General Motors Corp.

82

New grooved-end Nordstrom semi-steel valve introduced

The introduction of a new grooved-end version of the Standard 2-bolt type Nordstrom semi-steel lubricated plug valves makes possible a tight, permanent connection to steel pipe with grooved end couplings. A deflection of several degrees at every joint, which allows the lines to follow the uneven contours of the ground, eliminates the need for level ditching and also offsets pipe vibration and overcomes the problem of pipe expansion and contraction. Wrench-operated, the new valve has a pressure rating of 175 psi., WOG, and is produced in 2-, 2½-, 3-, an 4-in.

sizes, weighing 14½, 22½, 35, and 55½ lb., respectively. Recommended for use on fuel and water lines, drainage lines and pumps, air lines and connections and all temporary lines. Manufacturer is Rockwell Manufacturing Co.

83

Smooth bore suction hose can't be misshapen

Revelation, a high grade smooth bore suction hose with red covers has the advantage of recovery to original shape after being run over or crushed. The wire has been eliminated and replaced by a specially treated hard twisted cord. Sizes range from 1- to 3-in. inside diameter, with weights from 75 to 262 lb. per 100 ft. Standard lengths are 10, 12½, 15, 20, 25, and 50 ft. Send in for samples, prices and other information. Manufacturer is Hamilton Rubber Manufacturing Corp.

84

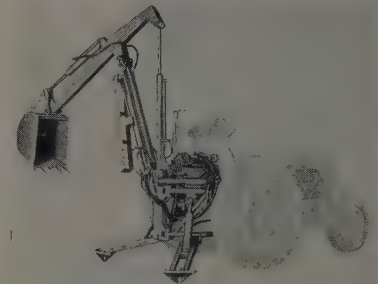
New protective sheeting stops abrasion and corrosion

Reported to give absolute protection to all kinds of equipment for long periods of time is Iron-Rubber, latest addition to the Magic-Vulc line. This protective sheeting comes either reinforced (two sheets permanently bonded to a central core of expanded steel) or nonreinforced. Ideally applicable to chutes, hoppers and launders, ball mills, ducts and pipes, tanks, etc. Manufacturer is Magic Chemical Co. Send in for complete details and prices.

85

Power diggers designed for long life, hard wear

Major improvements in the latest Sherman hydraulic power diggers are aimed at giving contractors long,



service-free usage. For instance, the dipstick is now of fabricated box construction, insuring added strength to meet the most severe operating conditions. Booms have been reinforced and have nearly 100% greater bearing surface at hinge points on the dipstick and swing frame. A new design and method of mounting distributes the thrust of the digging operation, imparting a cushioning effect which relieves direct strains on the entire unit, tractor as well as digging equip-

ment. The dipstick is now available in two sizes for obtaining depths of either 8 or 10 ft. Manufacturer is **Sherman Products, Inc.** Free descriptive literature is available.

B6

Water repellent coating for porous masonry construction

Armor Coat, a product which is applied like paint and is recommended for protection against water damage as well as for beautification, has been made available to the construction industry after many years of application in other fields. Another such product is Silinite, a clear silicone base water-proofing compound for any unpainted above-grade masonry structure of any age. It does not affect the color and texture of the surface being treated. Manufacturer is **Armor Laboratories.**

B7

Here's a way to get rid of dust from asphalt plants

This compact Wet-Washing System has been especially constructed for the efficient and economical removal of dust normally exhausted into the atmosphere by asphalt plants. Designed for use with any plant, it may be easily installed on the exhaust side of any existing blower or fan and is complete with horizontal spray chambers, vertical scrubber, duct work from fan, and manifold spray chambers. This system (which requires very little water) meets the most stringent air pollution requirements of such smog-troubled cities as Los Angeles. Manufacturer is **Standard Steel Corp.**

B8

Henry has a new heavy-duty hydraulic tractor shovel

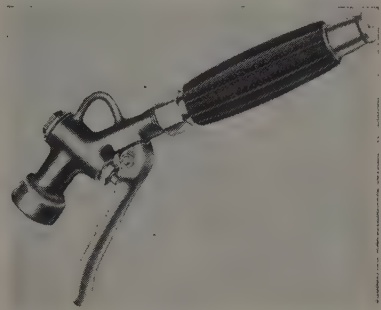
An addition to the family of hydraulic earthmovers made by **Henry Manufacturing Co.** is a new hydraulic tractor shovel for heavy-duty use. It

utilizes the same reservoir, pump, valve and cylinder systems as Henry's backhoes. Teamed with a backhoe, it is claimed to triple the usefulness of a tractor and will enable dealers to offer a complete tractor-mounted unit with both front and back equipment from one manufacturer. The tractor shovel is of all-steel construction, all electric-arc welded, all Henry-made throughout, including cylinders. The extra-large capacity bucket adapts itself to practically any loose, bulky material. Send in for complete information.

B9

Adjustable fog gun available

By a simple twist of the wrist a new fog gun is adjustable in variable degrees from a soft conical fog to a hard driving jet. Instant on-off con-



trol is obtained by means of the trigger shut-off included with the nozzle. This Model H5G is ideal for various applications, both indoors and outdoors. It works well at pressures from 30 to 150 lb. psi. Priced at \$9.95, complete with shut-off. Manufacturer is **Bete Fog Nozzle, Inc.**

B10

Tractor-drive generator designed for standby service

A new generator, designed for belt-drive and producing regular 115/230-volt, 60-cycle alternating current electricity, insures tractor owners of low-cost emergency power. Mounted on a pivot-type base which maintains correct tension on the belt, the generator is equipped with a non-slip, flat belt pulley. Positive circuit-breaker guards

excessive overloads. Rugged, precision construction is featured. Offered in 3,000-, 4,000-, 7,000- and 10,000-watt capacities. Manufacturer is **D. W. Onan & Sons, Inc.** Form A269 is available.

B11

New Lombard chain saw

Lombard Governor Corp. has announced its new Model 35 chain saw for a wide variety of wood cutting operations. This powerful, gas-powered, streamlined instrument features trigger control and a new, fast chain, direct carburetor connection, close-to-ground cutting, automatic oiler and automatic shut-off.

QUALITY INSTRUMENTS

Imported from Japan

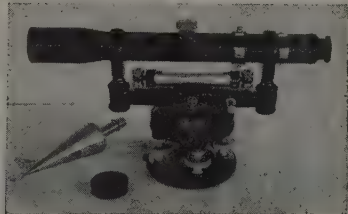
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News of DISTRIBUTORS

... Continued from page 113

South Dakota and North Dakota. Prior to his Pioneer appointment, Fair was in the equipment distributor field as head of his own firm in Denver, and since 1929 his organization had been associated with Pioneer as its dealer in the state of Colorado.

Brown Bevis moves

Brown Bevis Industrial Equipment Co. moved on February 1 to new and enlarged quarters at 6550 E. Washington Blvd., Los Angeles.

Changes in field personnel by Detroit Diesel

Among recent changes in the field sales and service organization of the Detroit Diesel Engine Division of General Motors announced by E. F. Bentley, general sales manager of the division, are the following: Bart W. Patrick, sales representative in the division's Northwest zone which includes the states of Oregon and Washington, is transferred to New

England. J. T. Hanna, former service representative in Oregon and Washington, becomes sales representative in the same zone, and Harold J. Vaughn moves West from Detroit to the post vacated by Hanna.

Ets-Hokin & Galvan appointments

Ets-Hokin & Galvan, San Francisco, announces the appointment of Ralph Askin as representative to the building trades and special industries. Askin has been with Ets-Hokin & Galvan for seven years, and prior to his new position was vice president in charge of the Oakland branch. Succeeding him as Oakland branch manager is Frank Badsby.

Polizoto made Bullard manager in Los Angeles

E. W. Bullard, president of the E. D. Bullard Co., San Francisco, has announced that Joseph L. Polizoto has been appointed manager of the firm's Los Angeles office. Associated with the company since 1934, he has been assistant Los Angeles manager since 1942. E. D. Bullard Co. is one of the nation's oldest manufacturers of industrial safety equipment with offices and distributors throughout the world.

board of directors and executive committee last June. He has been general manager of the explosives department for the past year, a post in which he is succeeded by W. Clayton Lytle.

LeTourneau-Westinghouse sales appointments

W. E. Hendricks, who has served as assistant to the general sales manager for LeTourneau-Westinghouse



Hendricks

Rager

Co. since last June, has been named domestic sales manager, succeeding H. R. Powers, resigned. Also announced is the appointment of Lloyd Rager as sales promotion manager. Assistant advertising manager for the past four years, he has been with LeTourneau 17 years.

Marlow adds to sales staff

John L. North has been named assistant to sales manager of Marlow Pumps, manufacturer of self-priming centrifugal pumps. He will make his headquarters in the company offices in Ridgewood, N. J.

Baker builds new plant

Baker Manufacturing Co., a leading manufacturer of snow plows, road-building machinery and earth-moving equipment, is to have a new 40,000-sq. ft. manufacturing plant soon to be erected on a 20-ac. tract at Beardstown, Ill., according to President W. Converse Staley. The new factory—a standardized steel frame structure—will supplement production at the company's main plant in Springfield, Ill., which completed a \$1,500,000 expansion recently. George D. Phares, a Baker veteran, will be works manager of the Beardstown plant.

Six Northwest firms combine

The first of the year, six well-known western Washington concrete products firms combined forces, according to announcement by W. F. Paddock, chairman of the board of directors of Graystone Concrete Products Co. In the consolidation move, the Graystone Co. of Seattle joins with Grays Harbor Cement Products Co., Aberdeen; Lewis Materials Co., Centralia; Everett Concrete Products Co., Everett; Graystone Materials Co., Olympia, and Mason Materials Co. at Shelton. Besides Paddock, officers of the organization include F. M. Kettering, president and general manager; W. S. Wilson, vice president

MANUFACTURERS

Keasbey & Mattison expands

According to announcement by Ernest Muehleck, president of Keasbey & Mattison Co., the company's recently completed \$2,750,000 plant at Santa Clara, Calif., is now producing "Century" asbestos-cement pressure pipe, thereby enabling the 80-year old firm to provide better service to its customers and meet the increasing demand for asbestos-cement pressure pipe in the West. Founded in 1873, Keasbey & Mattison now has ten plants located in five strategic areas, as well as seven district offices.

Ziegler expansion

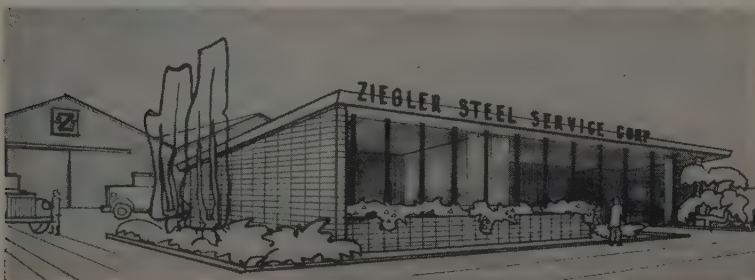
Herbert Ziegler, president of Ziegler Steel Service Corp., announces the third major expansion of the com-

pany, the doubling in size of the Los Angeles division plant and office. The new offices are arranged for maximum efficiency in handling steel orders of any size. The recent warehouse addition houses new equipment including heavy-duty overhead cranes and cutting machinery. The Ziegler company carries a complete line of steel: sheet, strip, bars and various shapes, and maintains sales representation in San Diego, Phoenix, Salt Lake City, Albuquerque, Dallas, Portland and Seattle, in addition to resident salesmen in the Los Angeles and San Francisco Bay areas.

Copps becomes Atlas Powder v.p.

Atlas Powder Co. has elected D. J. C. Copps a vice president in charge of the company's explosives, industrial finishes and engineering departments, Ralph K. Gottshall, president, recently announced. Copps, who joined Atlas in 1929, was elected to the

ARCHITECT'S drawing of Ziegler Steel Service Corp.'s expanded headquarters.
(See accompanying item for more information.)



and general sales manager; R. E. Metzger, vice president and manager of the Centralia operation, and Mott Rieke, treasurer and controller.

R. W. Condon, formerly Seattle sales manager, is the new manager at Seattle, and John W. James, who was Seattle factory manager, is now manager of the Olympia operation. Other plant managers include: W. B. Judah, Shelton; R. J. Bracken, Aberdeen, and Larry Gourlie, Everett.

Calaveras Cement news

Calaveras Cement Co. announces that a third of a million dollars will be expended in 1954 to increase the efficiency of its San Andreas, Calif., plant. H. C. (Pat) Maginn, chairman of the Calaveras finance committee, told the board of directors at a recent meeting that the improvement program "not only will lower production costs but will set a new high in service to contractors and dealers."

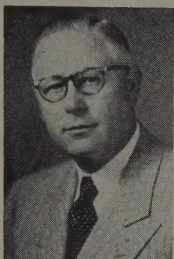
Truscon Steel personnel changes

C. B. McGehee, general manager of sales, Truscon Steel Division of Republic Steel Corp., announces the appointment of A. B. Greene as manager of sales, reinforcing products, replacing C. L. Spatholt who recently died. Also announced is the appointment of Wayne R. Woolley as high-way products engineer. Both men will

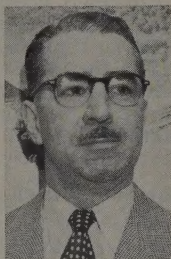
headquarter at the company home office in Youngstown, Ohio.

Allis-Chalmers ups Klein

According to an announcement by W. A. Roberts, president of Allis-Chalmers Manufacturing Co., William J. Klein has been named vice president and general sales manager of the tractor division. Until this latest appointment, he had been manager of the Minneapolis branch of the division. Klein started his career with A-C as a salesman in 1928.



Klein



Belanger

Belanger appointed Pioneer sales manager

A. J. (Joe) Belanger was recently made sales manager of Pioneer Engineering Works, Inc., according to C. R. Rolf, vice president in charge of sales. Well known in the road con-

struction industry, especially among asphalt paving contractors with whom he has had close contact since 1948, Belanger will direct the activities of Pioneer Sales representatives throughout the United States and Canada.

AISC election

John E. Jackson, president of Pittsburgh-Des Moines Steel Co., has been reelected president of the American Institute of Steel Construction. The other officers, all of whom were reelected, are Earle V. Grover of Apex Steel Corp., Ltd., Los Angeles, first vice president; N. P. Hayes, second vice president; James M. Straub, treasurer; M. Harvey Smedley, secretary, and L. Abbett Post, executive vice president. All nine directors were reelected and one new member was chosen: Laurence McKinney, president of James McKinney & Sons, Inc., Albany, N. Y.

Killebrew elected Clark Equip. v.p.

The election of Clarence E. Killebrew as vice president of Clark Equipment Co., manufacturer of materials handling and earth-moving equipment, is announced by George Spatta, president. Killebrew formerly was manager for marketing and sales in the company's construction machinery division. He will have similar re-

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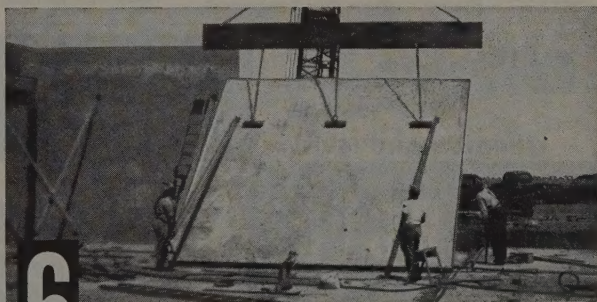
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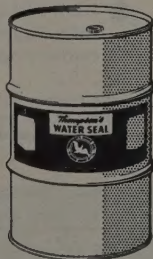
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sponsibility in his new position, and will be in charge of sales and marketing of all products sold under the "Michigan" trade name. These include truck-mounted and crawler type power shovels, cranes and draglines, in addition to a new line in 1954 of bulk-handling and earth-moving equipment.

Euclid tests 4-wheel drive scraper

As a further development of the principles successfully used in the 4-wheel drive Euclid Twin-Power Scraper, the Euclid Division of General Motors Corporation recently



placed two new experimental units on construction projects. The 4-wheel drive principle provides excellent traction. It is reported that field tests to date indicate this scraper has the ability to self load in many materials. No production of this model is scheduled for 1954, pending outcome of the field tests.

KSM news

KSM Products, Inc., manufacturer of welding studs and stud welding equipment, announces the addition of a new distributor, S&S Industries, to cover Arizona, New Mexico, Oklahoma, Texas and west Louisiana. S&S Industries, Inc., headed by Herbert W. Scott, Jr., and Robert H. Simon, is located at 4320 Alief Road, Houston, Tex.

Elledge elected Material Handling Institute prexy

Charles B. Elledge of General Electric Co. was elected president of The Material Handling Institute, Inc., for 1954 at the annual meeting in December. Other MHI officers chosen are: Walter E. Schirmer and Edward W. McCaul, first and second vice presidents respectively.

Solar buys Rawlins warehouse

Solar Steel Corp. has extended its steel warehousing service coast to coast with the purchase of the warehousing operations of Rawlins Bros., Inc., West Coast steel warehousing and hardware supply firm in Los Angeles. According to Sol H. Friedman, president of Solar, the Rawlins warehouse will henceforth be operated as Rawlins Bros. Steel Division of Solar Steel Corp. of California. Rawlins Bros. will continue to operate its hardware supply business under the Rawlins name.



IT'S FIFTY years since Caterpillar Tractor Co. first began the manufacture of track-type tractors. Here L. N. Neumiller, president (left) and H. S. Eberhard, executive vice president, unveil a medallion which represents the theme for a commemorative program to be conducted by the firm throughout 1954.

Proposed Merritt-Chapman & Scott expansion

Acquisition of the Newport Steel Corp. of Newport, Ky., by Merritt-Chapman & Scott Corp., 93-year old construction organization, is proposed in a registration statement filed with the Securities & Exchange Commission. Merritt-Chapman & Scott recently expanded its operations into the field of steel production with the purchase of the Milton Electric Steel Corp. Louis E. Wolfson, president and chairman of the board of M-C&S, said the proposed acquisition of Newport Steel is designed to provide further diversification in the scope of the company's operations.

Galion acquires Austin Overshot loaders

The Galion Allsteel Body Co. has acquired sales and manufacturing rights to the complete line of Austin Overshot tractor loaders patented and built by John Austin Mfg. Co., Denver. In making the announcement, President Oliver C. Henkel stated the Galion firm anticipates that all Austin activities will be moved to Galion Allsteel's plants in Galion and Mansfield, Ohio, in the near future.

Hercules Powder news

With the beginning of a new year, Hercules Powder Co., announces the retirement of three of its top men. Russell H. Dunham, the first president and former chairman of the board of directors, retired after 51 years of active service with the company, but will remain as a member of the board of directors and finance committee. After 39 years of service with Hercules, William R. Ellis, vice president, and member of the board, also retired. Retirement of John R. Horlick, Jr., manager of the technical service division of the explosives department, is also announced. He, too, had been with Hercules for 39 years. Milo A. Nice has been appointed to succeed Horlick.

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Johnston Stainless Welding Rods

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BACKFILL, uncompacted

It was different in the good old days

A method of through-cut excavation that has been beaten out by modern equipment production rates, as well as by modern labor rates, is the Swede tunnel, or excavation by tunneling and trapping. This technique was described in *Western Construction* 25 years ago by B. H. Henry, superintendent of Convict Camp No. 12 of California's Division of Highways.

A cut alignment near the Trinity-Shasta county line was tunneled to about 6 x 8-ft. section, fully timbered, using convict labor. (There were 120 men on the job, and only one 1¼-yd. gas shovel.) Traps in the tunnel roof were opened at intervals to take the muck down after it had been lightly shot. Scalpers in the widening cone of the cut above assisted in keeping the material moving, "which it readily does, especially in dry weather, when it runs like sugar."

Results were reported very satis-

factory, with between 3 and 9 cu. yd. per lin. ft. of clean-up muck remaining to be moved out by power shovel when the cut had been entirely daylighted.

The family tie

Sometimes construction workers do a lot of traveling in the course of following their trade, and sometimes members of the same family get pretty widely separated as a result.

For instance, Mrs. G. L. Craw writes in from Camp Leigh, Peru, where her husband is a job superintendent for Morrison-Knudsen, asking to renew their subscription to *Western Construction* and telling us that they are especially interested in the series of stories on the Alcan Project, possibly because their son is setting turbines in the underground powerhouse there.

Mrs. Craw also has a few kind words for our circulation department: "Our subscription has followed us to Brazil, to Venezuela, and

now to Peru with only an occasional issue falling into alien hands. Keep up the good work."

Detective story

Lots of excitement was generated in San Francisco recently where steel structures were being erected on a section of the Bayshore Freeway. A 118-ft. steel girder was being lifted into place, but no matter how the crew pushed, pulled, swung, or shifted it, it didn't fit. "It's about 6 in. too short," said Francis J. Murphy, Judson-Pacific-Murphy Corp. project engineer.

State inspectors checked over fabrication details and job specifications, but the girder was fabricated correctly and no error was found in the specs. They were just about to call in Mike Hammer to find the missing 6 in., when it was discovered that one of the support columns was out of line.

Ilmar O. Jahlstrom, a state bridge engineer, said an error in surveying caused the column to be put up in the wrong place, but that it could be corrected by about two days' work, including driving six piles and dismantling and re-erecting the column on a new footing.

She learns fast

Friend of ours has just completed his second season on the Reservoir No. 22 job being built for the City and County of Denver by Macco and Puget Sound Bridge & Dredging. During that time his first-born has grown from a bundle to a young lady of 2½ yr. And a well-educated one, according to her dad: "Already she knows that the dam is concrete, not cement!"

No grave diggers needed

"Thar's gold in them thar graves," or at least that is what lots of people have been led to believe. It seems that somehow or another a rumor has gotten around that grave-digging jobs were open at the Folsom Dam construction site on the American River in central California. And that pay ranged from \$5 to \$12 an hour.

Well, as many as 10 men a day have been coming in from as far away as the state of Washington in search of this bonanza. Charles Beatie, project engineer on the job for the Corps of Engineers, wants it known that the story is definitely not true. "Some construction workers probably got together in a bar room and dreamed up the story," he said.

Twenty-five years ago in *Western Construction*

"Charles H. Williams, for the past nine years assistant district engineer at Chehalis, for the Washington State Highway Department, has been appointed city engineer of Tacoma, to succeed Charles I. Singer, who has resigned."

* * *

"With the completion of the Sir Francis Drake hotel, at a cost of \$5,000,000, another outstanding record was made by J. J. Rosedale, consulting safety engineer of San Francisco; for there was not a fatal or serious accident during the entire construction of this 26-story building."

* * *

General Construction Co. of Seattle had excavated the spillway and diversion tunnel for Owyhee Dam in Oregon, and reported good progress on excavation of the spillway shaft. Dam foundation excavation was also under way, with a 25-ton, 900-ft. span Lidgerwood cableway being installed. Tunnel and shaft excavation equipment included "No. 17 Denver rock

drills and No. 11 jackhammers, ⅝-yd. Erie air tunnel shovel, 6-ton Whitcomb gas dinkey, 1½-yd. V Western side dump cars, Ingersoll-Rand No. 50 drill sharpener, two 1300 Chicago pneumatic compressors. For concreting and grouting tunnel: Ransome concrete gun, Ransome grout machine, and Koehring mixer. For excavating dam foundation: 2½-yd. Marion steam dragline, No. 105 Northwest convertible dragline or shovel, six 16-yd. Western air-dump cars. For general use: No. 30 Best tractor, White gasoline passenger car, two locomotives, . . ."

* * *

"Paul Jones, division engineer on the Kittitas highline canal, Yakima project, Bureau of Reclamation, together with six other engineers, has been transferred to Las Vegas, Nevada, to continue the detailed surveys of the Black Canyon [Hoover] dam site, which will take about three months' time. Walker R. Young, construction engineer on the Kittitas project, made the original surveys."

... The Editors